Technical Specification Group Services and System Aspects
Meeting #21, Frankfurt, Germany, 22-25 September 2003

TSGS#21(03)0382

Source: **TSG SA WG2**
Title: **CRs on 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 #21.

Tdoc #	Title	Spec	CR #	cat	Version in	REL	WI	r
S2-033118	Removing PDP addressing of the target UE	23.271	206r1	F	4.9.0	4	LCS2	S2
S2-033028	Removing PDP addressing of the target UE	23.271	207	A	5.7.0	5	LCS2	S2
S2-033029	Removing PDP addressing of the target UE	23.271	208	A	6.4.0	6	LCS2	S2
S2-033081	Correcting reference to LIF-MLP specification	23.271	211	F	5.7.0	5	LCS2	S2
S2-033082	Correcting reference to LIF-MLP specification	23.271	212	A	6.4.0	6	LCS2	S2
S2-032724	Positioning of CS emergency service calls	23.271	187r3	B	6.4.0	6	LCS2	S2
S2-033039	Clearing editorial and other notes	23.271	190r2	F	6.4.0	6	LCS2	S2
S2-032646	The additional parameter validity time of the location request sent to the UE	23.271	193r1	B	6.4.0	6	LCS2	S2
S2-032647	Additional response message from LCS Client to GMLC in MO-LR procedure	23.271	194r1	B	6.4.0	6	LCS2	S2
S2-032657	Update of reference to OMA MLP specification	23.271	196r1	D	6.4.0	6	LCS2	S2
S2-032723	Pseudonym address and emergency identification	23.271	197r1	D	6.4.0	6	LCS2	S2
S2-032721	Routing of Emergency Calls based on Geographical Coordinates	23.271	198r3	B	6.4.0	6	LCS2	S2
S2-033126	Addition of Missing Indicator of Privacy Action as a Result of a Privacy Check	23.271	200r1	F	6.4.0	6	LCS2	S2
S2-032836	An additional parameter to limit the LCS Client	23.271	201r3	B	6.4.0	6	LCS2	S2
S2-032837	Introduction of location estimate in the change of area event LDR procedure	23.271	203r3	B	6.4.0	6	LCS2	S2
S2-032838	CR of synchronous & asynchronous procedures in GMLC	23.271	205r2	B	6.4.0	6	LCS2	S2
S2-033050	LCS Capabilities and LCS Client Type	23.271	209	D	6.4.0	6	LCS2	S2
S2-033251	Clarification on the privacy check procedure in Rel-6.	23.271	210r5	F	6.4.0	6	LCS2	S2

Note: The clause 5.5.1 is affected instead of clause 6.4.2 in CR #196r1.

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 193 ⌘rev 1 ⌘ Current version: 6.4.0 ⌘

*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: ⌘	The additional parameter validity time of the location request sent to the UE	
Source: ⌘	Huawei, China Mobile, TeleCommunication Systems	
Work item code: ⌘	LCS2	**Date:** ⌘ 08/07/2003
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 the Change of Area Event procedure in Section 9.1.9 of TS 23.271 V 6.4.0, the validity time of the location request is not sent to the target UE. When the validity timer expires, as described in Section 9.1.9.1, a cancellation procedure is initiated by a GMLC to cancel a pending Area Event LDR. However, if the UE is unreachable at that moment, the cancellation procedure will fail. Similar to the optional mechanism described in Annex F, the validity time of the location request should be sent to the UE within the procedure illustrated in clause 9.1.9, so that the UE can determine when the location request should be terminated.
Summary of change: ⌘	When the validity time expires, the pending Area Event LDR should be deleted by the UE. The validity time of the location request is added to the message sent to the UE in the "Provide Subscriber Location" and "LCS Area Event Invoke" procedures.
Consequences if not approved: ⌘	When the validity timer expires and at that moment the UE is unreachable, the current cancellation mechanism as described in clause 9.1.9 will fail.

Clauses affected: ⌘	9.1.9			
Other specs Affected: ⌘	Y: X / N:	Other core specifications	⌘	24.080
	Y: / N: X	Test specifications		
	Y: / N: X	O&M Specifications		
Other comments: ⌘				

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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 >>

9.1.9 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

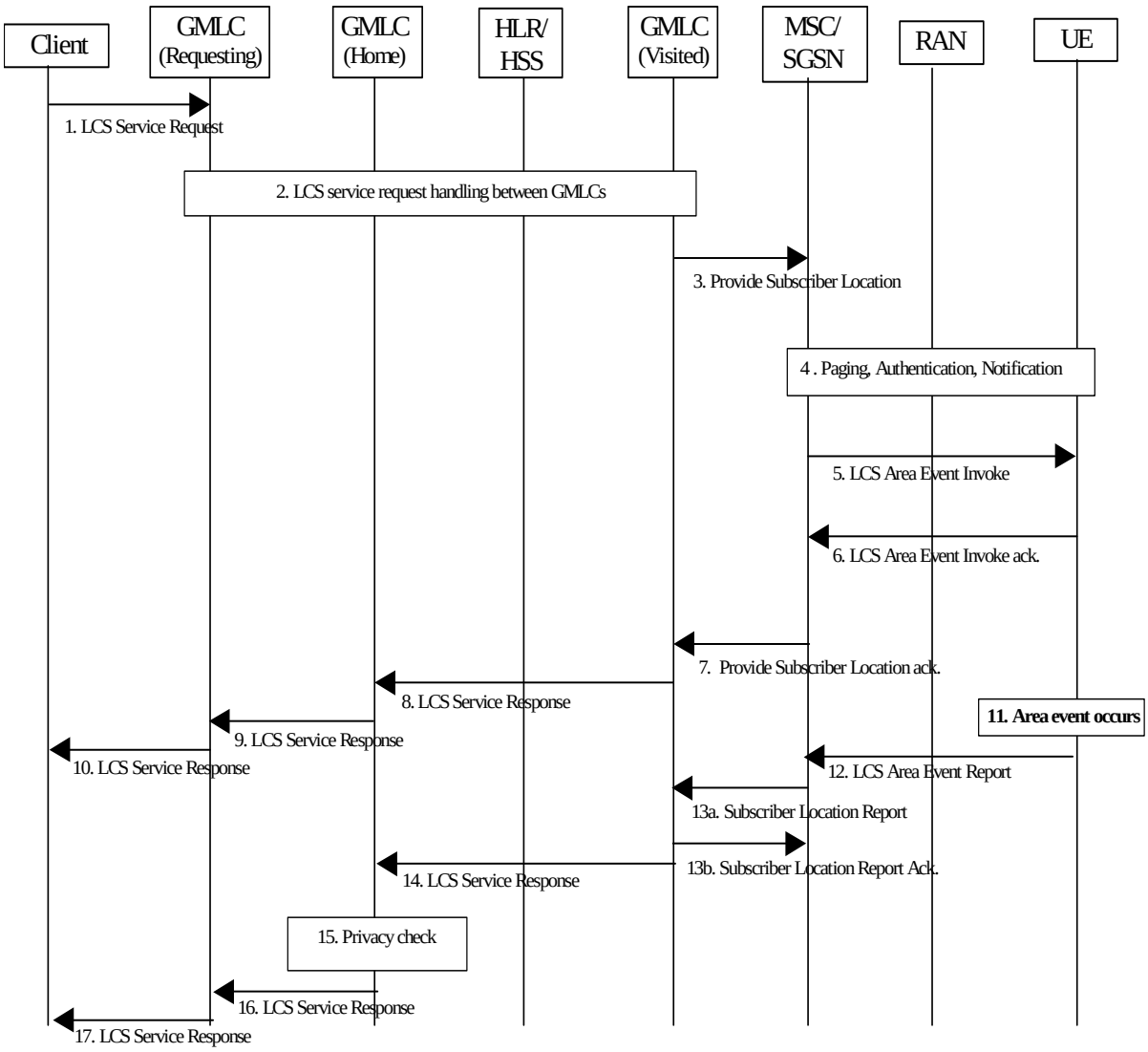

Figure 9.6d: Deferred MT-LR procedure for the Area event

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~~ may cancel the deferred location request as described in clause 9.1.9.1~~, when it is no longer valid~~. In addition, when validity time of a pending area event request in the target UE expires, the UE shall delete the pending deferred location request. 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 validity period of the location request, 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 validity period of the location request, 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.

< End of changed clause >>

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 194 ⌘rev 1 ⌘ Current version: 6.4.0 ⌘

*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:	⌘	Additional response message from LCS Client to GMLC in MO-LR procedure
Source:	⌘	Huawei, China Mobile
Work item code:	⌘	LCS2
Date:	⌘	08/07/2003
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),*
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Use one of the following releases:
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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:	⌘	In the current CS-MO-LR procedure, when the GMLC receives the MAP Subscriber Location Report from the MSC/MSC Server, if the GMLC can access the LCS Client identified by the UE, the GMLC will send a successful response message to MSC/MSC Server. Then the GMLC sends the LCS Client the Location Information message with location estimate. After the MSC/MSC Server receives the successful response message from GMLC, the MSC/MSC Server returns the LCS MO-LR Result to the UE with a confirmation that a location estimate was successfully transferred to the GMLC serving the LCS client. In this procedure, the MSC/MSC Server returns confirmation to the UE once GMLC informs MSC/MSC Server that the location information can be sent to LCS Client. In some error cases, the identified LCS Client doesn't support LCS service or the identified LCS Client doesn't store the data of the UE or can't handle location estimate of the UE successfully. Therefore, the UE only knows the location estimate was sent to the GMLC but doesn't know whether or not the identified LCS Client could handle it. The same problem can occur in current PS-MO-LR procedure.
Summary of change:	⌘	For both CS-MO-LR and PS-MO-LR procedures, when the identified LCS Client receives Location Information message, a response message is added to inform GMLC whether or not the location estimate of the UE was handled successfully. In the subsequent steps, this information is transferred to the UE.
Consequences if not approved:	⌘	The UE can't be informed when the LCS Client identified by UE doesn't support MO-LR or can't handle the location estimate of the UE successfully.

Clauses affected:	⌘	9.2.1, 9.2.1.3, 9.2.2, 9.2.2.3

Other specs Affected:	Y	N			
⌘	X		Other core specifications	⌘	24.080
		X	Test specifications		
		X	O&M Specifications		

Other comments: ⌘	

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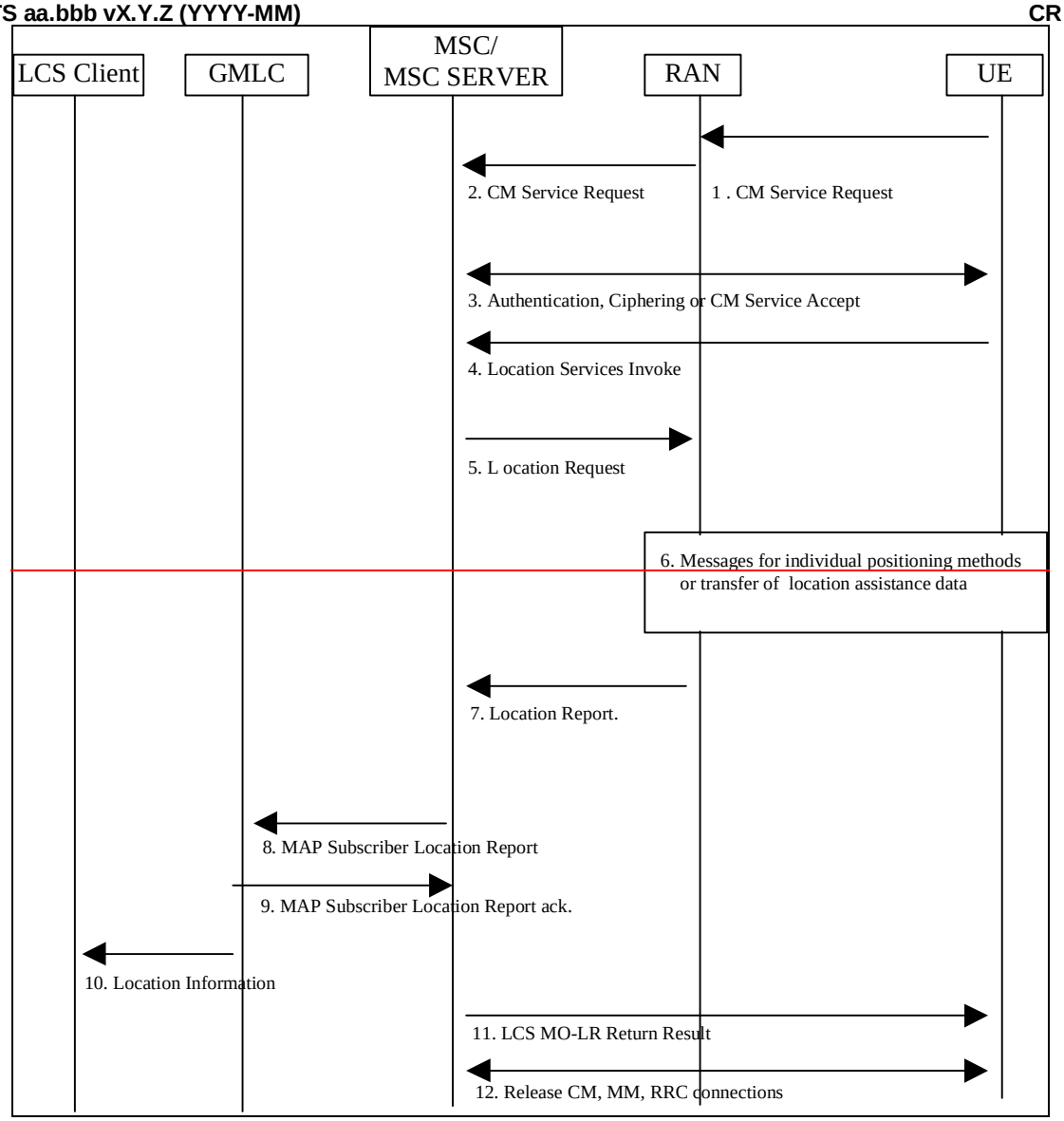
<< First changed clause >>

9.2 Mobile Originating Location Request

9.2.1 Mobile Originating Location Request, Circuit Switched (CS-MO-LR)

The following procedure shown in figure 9.7 allows an UE to request either its own location, location assistance data or broadcast assistance data message ciphering keys from the network. Location assistance data may be used subsequently by the UE to compute its own location throughout an extended interval using a mobile based position method. The ciphering key enables the UE to decipher other location assistance data broadcast periodically by the network. The MO-LR after location update request may be used to request ciphering keys or GPS assistance data using the follow-on procedure described in TS 24.008 [24]. The procedure may also be used to enable an UE to request that its own location be sent to an external LCS client.


LCS Client
GMLC
MSC/
MSC SERVER
RAN
UE
2. CM Service Request
1 . CM Service Request
3. Authentication, Ciphering or CM Service Accept
4. Location Services Invoke
5. L ocation Request
6. Messages for individual positioning methods
or transfer of location assistance data
7. Location Report.
8. MAP Subscriber Location Report
9. MAP Subscriber Location Report ack.
10. Location Information
11. LCS MO-LR Return Result
12. Release CM, MM, RRC connections

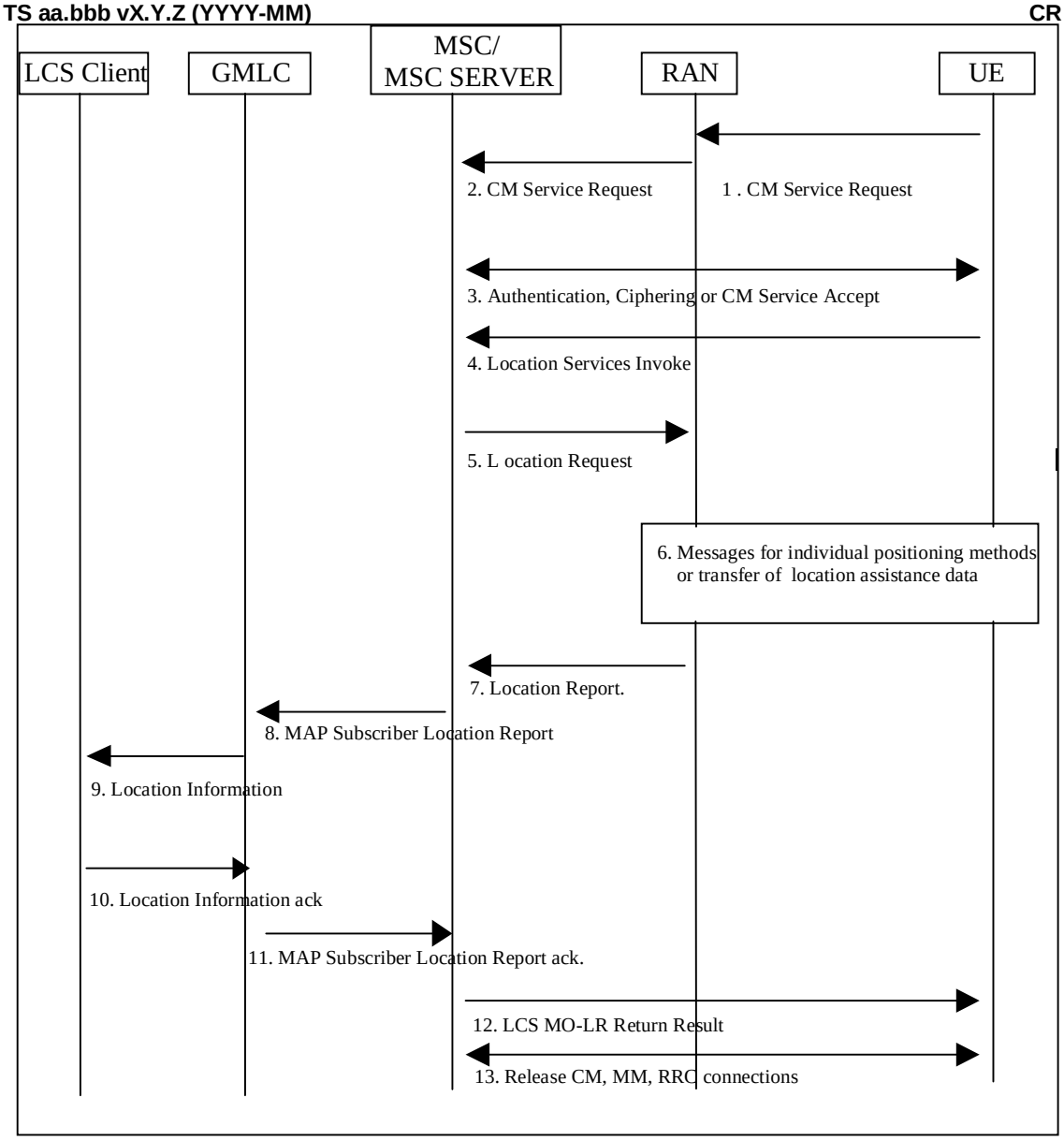


Figure 9.7: General Network Positioning for CS-MO-LR

9.2.1.1 Location Preparation Procedure

1) If the UE is in idle mode, the UE requests a radio connection setup and sends a CM service request indicating a request for a call independent supplementary services to the VMSC/MSC server via RAN.

2) RAN shall convey the CM service request to the core network. If the UE is in dedicated mode, the UE sends a CM Service Request on the already established radio connection.

3) The VMSC/MSC server instigates authentication and ciphering if the UE was in idle mode or returns a Direct Transfer CM Service Accept if the UE was in dedicated mode. The UE will inform the network about its LCS capabilities, as described in chapter 6.3.4.

4) The UE sends a LCS CS-MO-LR Location Services invoke to the VMSC/MSC server. Different types of location services can be requested: location of the UE, location of the UE to be sent to an external LCS client, location assistance data or broadcast assistance data message ciphering keys. If the UE is requesting its own location or that its own location be sent to an external LCS client, this message carries LCS requested QoS information (e.g. accuracy, response time), the requested maximum age of location and the requested type of location (e.g. "current location", "current or last known location"). If the UE is requesting that its location be sent to an external LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed. If a GMLC address is not included, the VMSC/MSC server may assign a GMLC address stored in the VMSC/MSC server. If a GMLC address is not available for this case, the VMSC/MSC server shall reject the location request. If the UE is instead requesting location assistance data or ciphering keys, the message specifies the type of assistance data or deciphering keys and the positioning method for which the assistance data or ciphering applies. The VMSC/MSC server verifies in the UE's subscription profile that the UE has permission to request its own location, request that its location be sent to an external LCS client or request location assistance data or deciphering keys (whichever applies). If the UE is requesting positioning and has an established call, the VMSC/MSC server may reject the request for certain non-speech call types.

5) In case the requested type of location is "current or last known location" and the requested maximum age of location information is sent from UE, the VMSC/MSC server verifies whether it stores the previously obtained location estimate of the target UE. If the VMSC/MSC server stores the location estimate and the location estimate satisfies the requested maximum age of location, this step and steps 6 and 7 may be skipped. Otherwise the VMSC/MSC server sends a Location Request message to RAN associated with the Target UE. The message indicates whether a location estimate or location assistance data is requested and, in GSM, includes the UE's location capabilities. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data.

9.2.1.2 Positioning Measurement Establishment Procedure

6) If the UE is requesting its own location, 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]. If the UE is instead requesting location assistance data, RAN transfers this data to the UE as described in subsequent clauses in TS 25.305 [1] and TS 43.059 [16] UE.

9.2.1.3 Location Calculation and Release Procedure

7) When a location estimate best satisfying the requested QoS has been obtained or when the requested location assistance data has been transferred to the UE, RAN returns a Location Report to the VMSC/MSC server. This message carries the location estimate or ciphering keys if this was obtained. If a location estimate or deciphering keys were not successfully obtained or if the requested location assistance data could not be transferred successfully to the UE, a failure cause is included in the Location Report.

8) If the UE requested transfer of its location to an external LCS client and a location estimate was successfully obtained, the VMSC/MSC server shall send a MAP Subscriber Location Report to the GMLC obtained in step 4 carrying the MSISDN of the UE, the identity of the LCS client, the event causing the location estimate (CS-MO-LR) and the location estimate and its age. Otherwise, this step and steps 9-~~10~~ 11 are skipped.

~~9) The GMLC shall acknowledge receipt of the location estimate provided that is serves the identified LCS client and the client is accessible.~~

~~10)~~9) If the identified LCS Client is not accessible, this step and step 10 are skipped. Otherwise ~~T~~the GMLC transfers the location information to the LCS client.

10) If the LCS Client doesn't support MO-LR (for temporary or permanent reasons) or can't handle the location estimate of the UE, e.g. LCS Client doesn't have the corresponding data of the UE, the LCS Client shall return the Location Information ack message to the GMLC with a suitable error cause. Otherwise, the LCS Client sends the GMLC the Location Information ack message signalling that the location estimate of the UE has been handled successfully.

11) If the identified LCS Client is not accessible, the GMLC sends MAP Subscriber Location Report ack to MSC/MSC server with an appropriate error case. Otherwise, the GMLC shall send MAP Subscriber Location Report ack to MSC/MSC SERVER. The message shall specify whether the location estimate of the UE has been handled successfully by the identified LCS Client, and if not, the corresponding error cause obtained in step 10.

~~11)~~12) The VMSC/MSC server returns an CS-MO-LR Return Result to the UE carrying any location estimate requested by the UE, ciphering keys or ~~a confirmation~~ an indicator whether ~~that~~ a location estimate was

successfully transferred to the ~~GMLC serving an~~identified LCS client. If the location estimate was successfully transferred to the identified LCS Client, the CS-MO-LR Return Result message shall specify whether the location estimate of the UE has been handled successfully by the identified LCS Client, and if not, the corresponding error cause obtained in step 11.

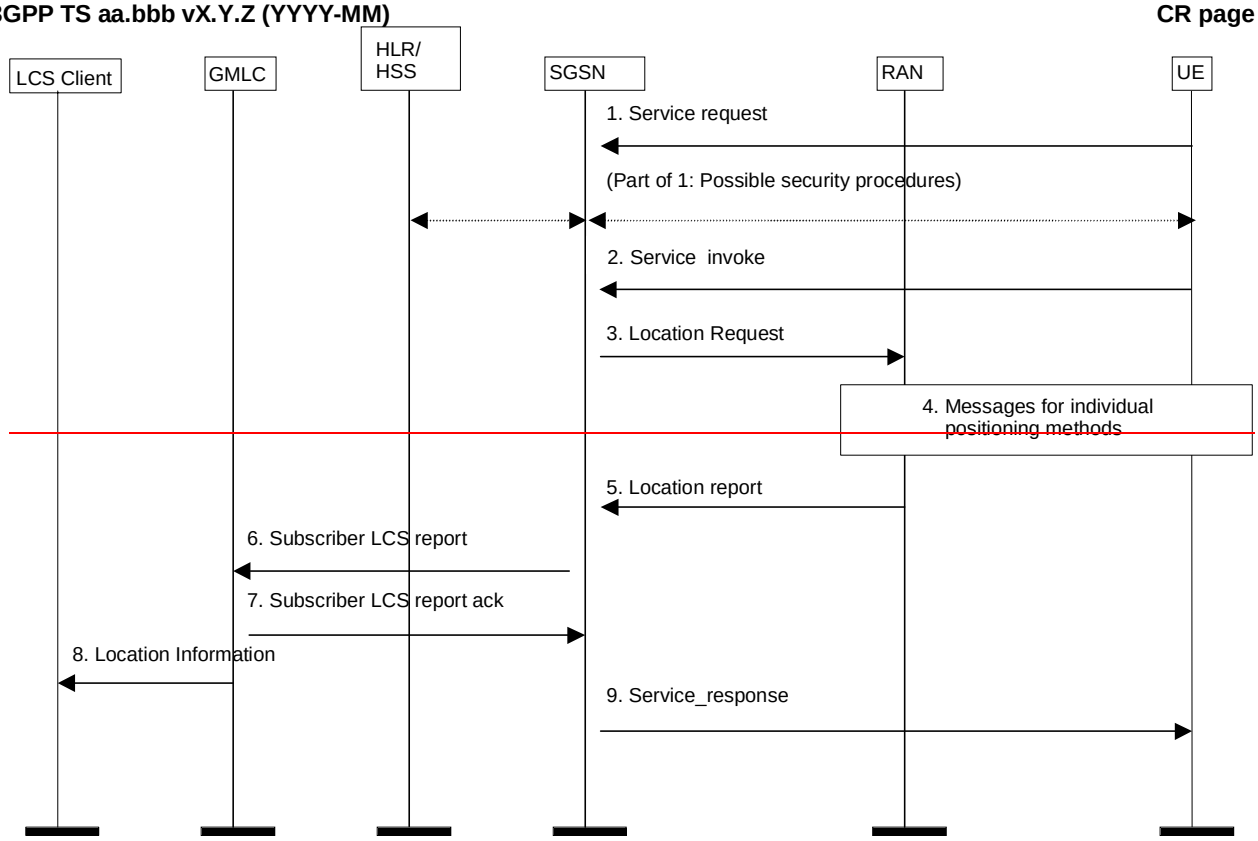
~~12)~~13) The VMSC/MSC server may release the CM, MM and radio connections to the UE, if the UE was previously idle, and the VMSC/MSC server may record billing information.

<< End of changed clause >>

<< Second changed clause >>

9.2.2 Mobile Originating Location Request, Packet Switched (PS-MO-LR)

The following procedure shown in figure 9.8 allows an UE to request either its own location; location assistance data or broadcast assistance data message ciphering keys from the network. Location assistance data may be used subsequently by the UE to compute its own location throughout an extended interval using a mobile based position method. A ciphering key enables the UE to decipher other location assistance data broadcast periodically by the network. The PS-MO-LR may be used to request ciphering keys or GPS assistance data. The procedure may also be used to enable an UE to request that its own location be sent to an external LCS client.



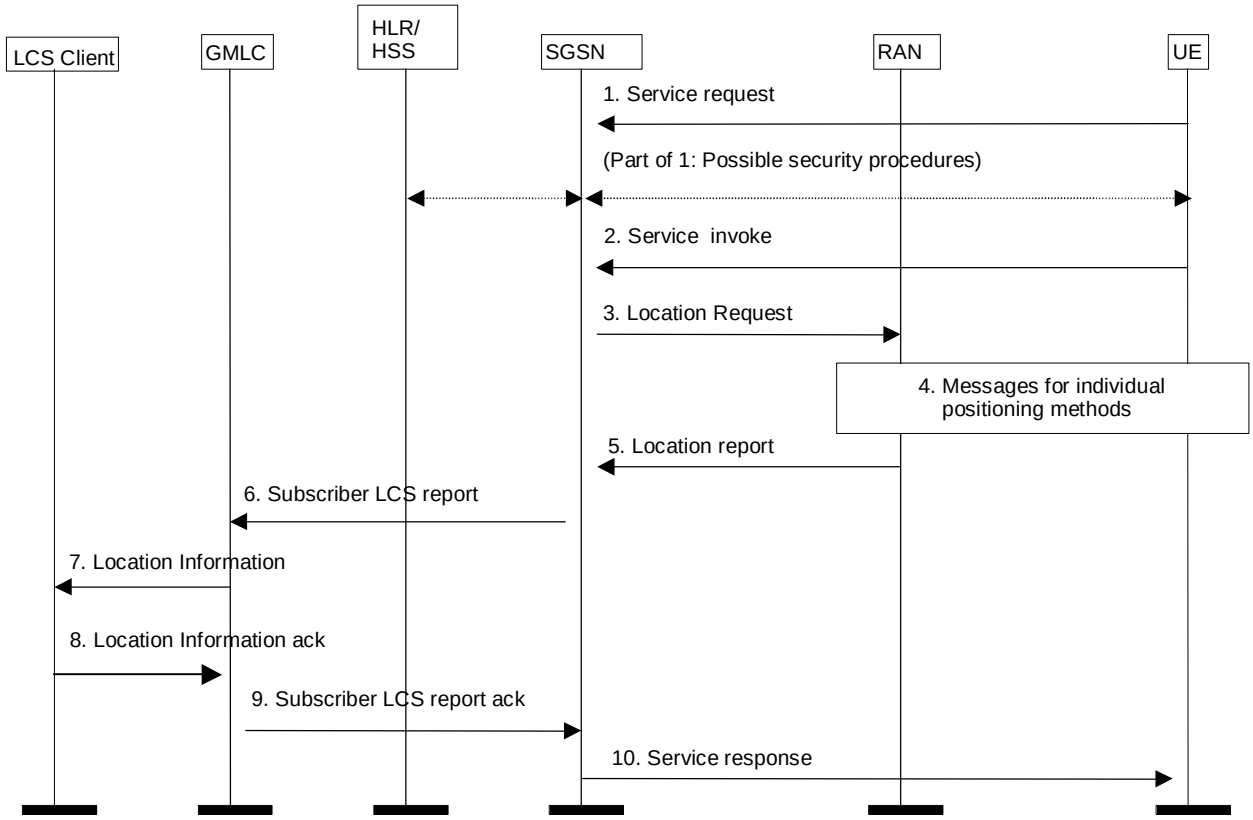


Figure 9.8: General Network Positioning for packet switched MO-LR

9.2.2.1 Location Preparation Procedure

1) In UMTS, if the UE is in idle mode, the UE requests a PS signaling connection and sends a Service request indicating signaling to the SGSN via the RAN. If the UE already has PS signaling connection, the UE does not need to send Service request. Security functions may be executed. These procedures are described in TS 23.060 [15]. In GSM this signaling step is not needed.

2) The UE sends a LCS PS-MO-LR Location Services invoke message to the SGSN. Different types of location services can be requested: location of the UE, location of the UE to be sent to an external LCS client, location assistance data or broadcast assistance data message ciphering keys. If the UE is requesting its own location or that its own location be sent to an external LCS client, this message carries LCS requested QoS information (e.g. accuracy, response time), the requested maximum age of location and the requested type of location (e.g. "current location", "current or last known location"). If the UE is requesting that its location be sent to an external LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed. If a GMLC address is not included, the SGSN may assign a GMLC address stored in the SGSN. If a GMLC address is not available for this case, the SGSN shall reject the location request. If the UE is instead requesting location assistance data or ciphering keys, the message specifies the type of assistance data or deciphering keys and the positioning method for which the assistance data or ciphering applies. The SGSN verifies the subscription profile of the UE and decides if the requested service is allowed or not.

3) In case the requested type of location is "current or last known location" and the requested maximum age of location information is sent from UE, the SGSN verifies whether it stores the previously obtained location estimate of the target UE. If the SGSN stores the location estimate and the location estimate satisfies the requested maximum age of location, this step and steps 4 and 5 may be skipped. Otherwise the SGSN sends a Location Request message to the RAN associated with the Target UE's location. The message indicates whether a location estimate or location assistance data is requested. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data. The message carries also location parameters received in the Service Invoke message.

9.2.2.2 Positioning Measurement Establishment Procedure

4) If the UE is requesting its own location, the actions described in UTRAN Stage 2, TS 25.305 [1] or GERAN stage 2 TS 43.059 [16] are performed. If the UE is instead requesting location assistance data, the RAN transfers this data to the UE as described in subsequent clauses. The RAN determines the exact location assistance data to transfer according to the type of data specified by the UE, the UE location capabilities and the current cell.

9.2.2.3 Location Calculation and Release Procedure

5) When a location estimate best satisfying the requested QoS has been obtained or when the requested location assistance data has been transferred to the UE, the RAN returns a Location Report to the SGSN. This message carries the location estimate or ciphering keys if this was obtained. If a location estimate or deciphering keys were not successfully obtained or if the requested location assistance data could not be transferred successfully to the UE, a failure cause is included in the Location Report.

6) If the UE requested transfer of its location to an external LCS client and a location estimate was successfully obtained, the SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 2 carrying the MSISDN of the UE, the identity of the LCS client, the event causing the location estimate (MO-LR-PS) and the location estimate and its age. Otherwise, this step and steps 7-~~8~~ 9 are skipped.

~~7) The GMLC shall acknowledge receipt of the location estimate provided that it serves the identified LCS client and the client is accessible.~~

~~8~~7) If the identified LCS Client is not accessible, this step and step 8 are skipped. Otherwise ~~T~~the GMLC transfers the location information to the LCS client.

8) If the LCS Client doesn't support MO-LR (for temporary or permanent reasons) or can't handle the location estimate of the UE, e.g. LCS Client doesn't have the corresponding data of the UE, the LCS Client shall return the Location Information ack message to the GMLC with a suitable error cause. Otherwise, the LCS Client sends the GMLC the Location Information ack message signalling that the location estimate of the UE has been handled successfully.

9) If the identified LCS Client is not accessible, the GMLC sends MAP Subscriber Location Report ack to SGSN with an appropriate error case. Otherwise, the GMLC shall send MAP Subscriber Location Report ack to SGSN. The message shall specify whether the location estimate of the UE has been handled successfully by the identified LCS Client, and if not, the corresponding error cause obtained in step 8.

~~9~~10) The SGSN returns a Service Response message to the UE carrying any location estimate requested by the UE, ciphering keys or ~~a confirmation~~ an indicator ~~that~~ whether a location estimate was successfully transferred to the ~~GMLC serving an~~identified LCS client. If the location estimate was successfully transferred to the identified LCS Client, the CS-MO-LR Return Result message shall specify whether the location estimate of the

UE has been handled successfully by the identified LCS Client, and if not, the corresponding error cause obtained in step 9.

~~NOTE: Steps 2 - 9 may be repeated a number of times in case of periodic location request.~~

<< End of changed clause >>

3GPP TSG-SA WG 2 Meeting #33
Sophia Antipolis, France, 7–11 July 2003

Tdoc ⌘S2-032657
(Revised S2-032554)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **196** ⌘ **rev** **1** ⌘ Current version: **6.4.0** ⌘

*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:	⌘	Update of reference to OMA MLP specification
Source:	⌘	Siemens
Work item code:	⌘	LCS2
Date:	⌘	09/07/2003
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 cge:	⌘	The reference to the OMA specification used at the Le interface needs to be updated, as the responsibility of the specification has been moved from LIF to OMA.
Summary of change:	⌘	The reference is updated
Consequences if not approved:	⌘	The reference to the MLP specification to be used at Le could not be identified.

Clauses affected:	⌘	6.4.2			
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 Modified Section **********

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~~ OMA 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 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;
- 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.

3GPP TSG-SA2 Meeting #33
Sophia Antipolis, France, 7–11 July 2003

Tdoc ⌘S2-032721

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **198** ⌘**rev** **3** ⌘ Current version: **6.4.0** ⌘

*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:	⌘	Routing of Emergency Calls based on Geographical Coordinates
Source:	⌘	Nortel Networks, AWS, Cingular, Lucent
Work item code:	⌘	LCS2
Date:	⌘	9/7/2003
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:	⌘	Accurate routing of emergency calls to the correct Emergency Service Provider is required. Enabling routing based on the geographical coordinates of the calling party will increase the probability of more accurate routing. A high level requirement has been added to LCS stage 1, 22.071 to optionally route Emergency calls to Emergency Service Providers based on the geographical coordinates (latitude and longitude) of the calling party. The LCS stage2, 23.271 need to be updated accordingly to satisfy the stage 1 requirement.
Summary of change:	⌘	dded new functionality in the GMLC, LCZTF. The LCZTF performs ransformations of a location into a zone identity. dded a new flow on NI-LR using Location Based Routing to the LCS Client. lso, clarified that in North America either NA-ESRD or NA-ESRK (not both) is ent to the emergency services client in the emergency call origination.
Consequences if not approved:	⌘	The LCS stage 1 requirement will not be met. The probability of routing Emergency Calls to the correct Emergency Service Provider may be reduced, timeliness and availability of emergency services may be adversely impacted.
Clauses affected:	⌘	3.3, 6.2, 9.1.5 New 5.4.1.4, 9.1.5A

Y **N**

Other specs affected:	⌘	X		Other core specifications	⌘ *TS 29.002*
			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 modified clause *****

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
LCZTF	Location Client Zone Transformation 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
LSCTF	Location System Co-ordinate Transformation 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].

***** New clause *****

5.4.1.4 Location Client Zone Transformation Function (LCZTF)

The Location Client Zone Transformation Function (LCZTF) performs transformations of a location (latitude and longitude) into a zone identity, which in North America identifies a particular emergency services zone.

***** 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
		Location Client Zone Transformation Function	LCZTF
	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

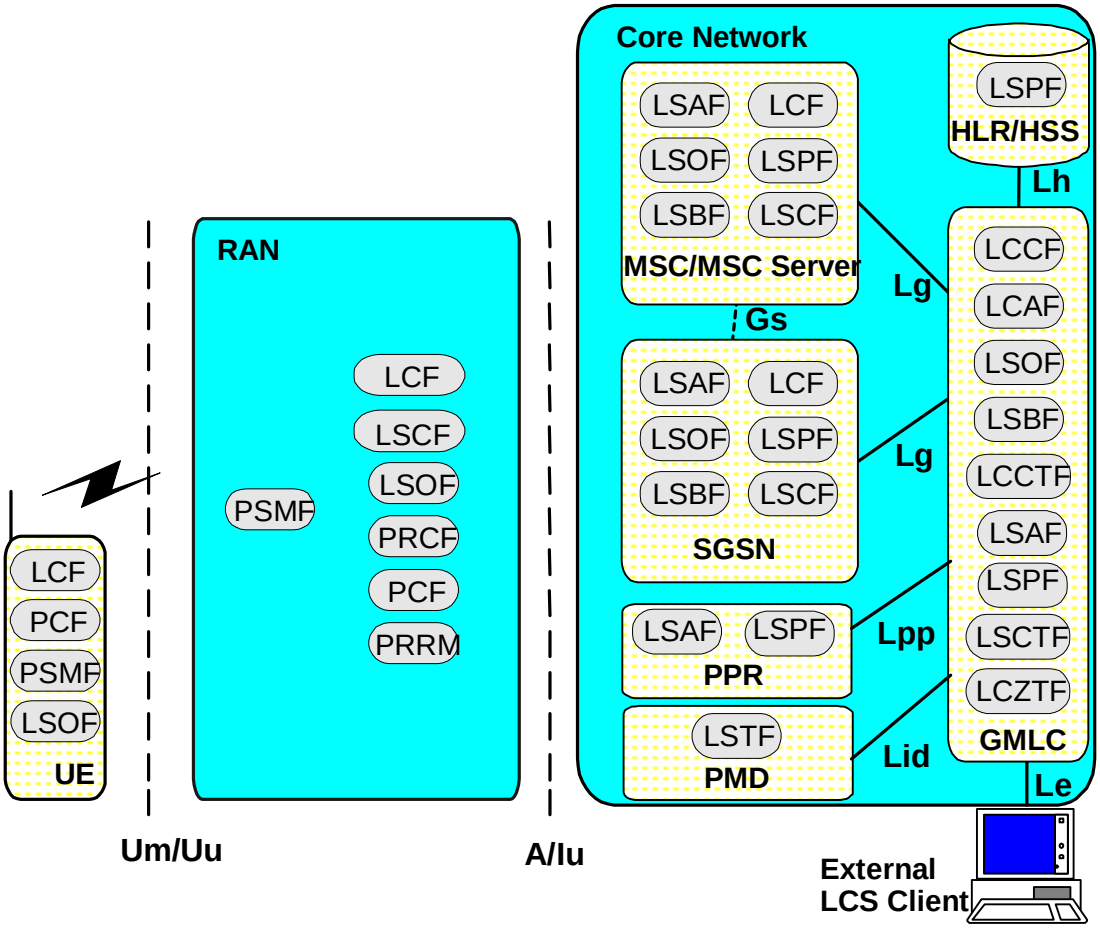
Table 6.2 and figure 6.2 illustrate the allocation of functional entities in the reference configuration of LCS. It is assumed that the CS and PS have either their own independent mobility management or use the joint mobility management through the optional Gs interface.

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						
LCZTF			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 Network
LSAF
LCF
LSOF
LSPF
LSBF
LSCF
MSC/MSC Server
Gs
SGSN
LSAF
LCF
LSOF
LSPF
LSBF
LSCF
PPR
LSAF
LSPF
PMD
LSTF
HLR/HSS
LSPF
Lh
LCCF
LCAF
LSOF
LSBF
LCCTF
LSAF
LSPF
LSCTF
LCZTF
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 Client

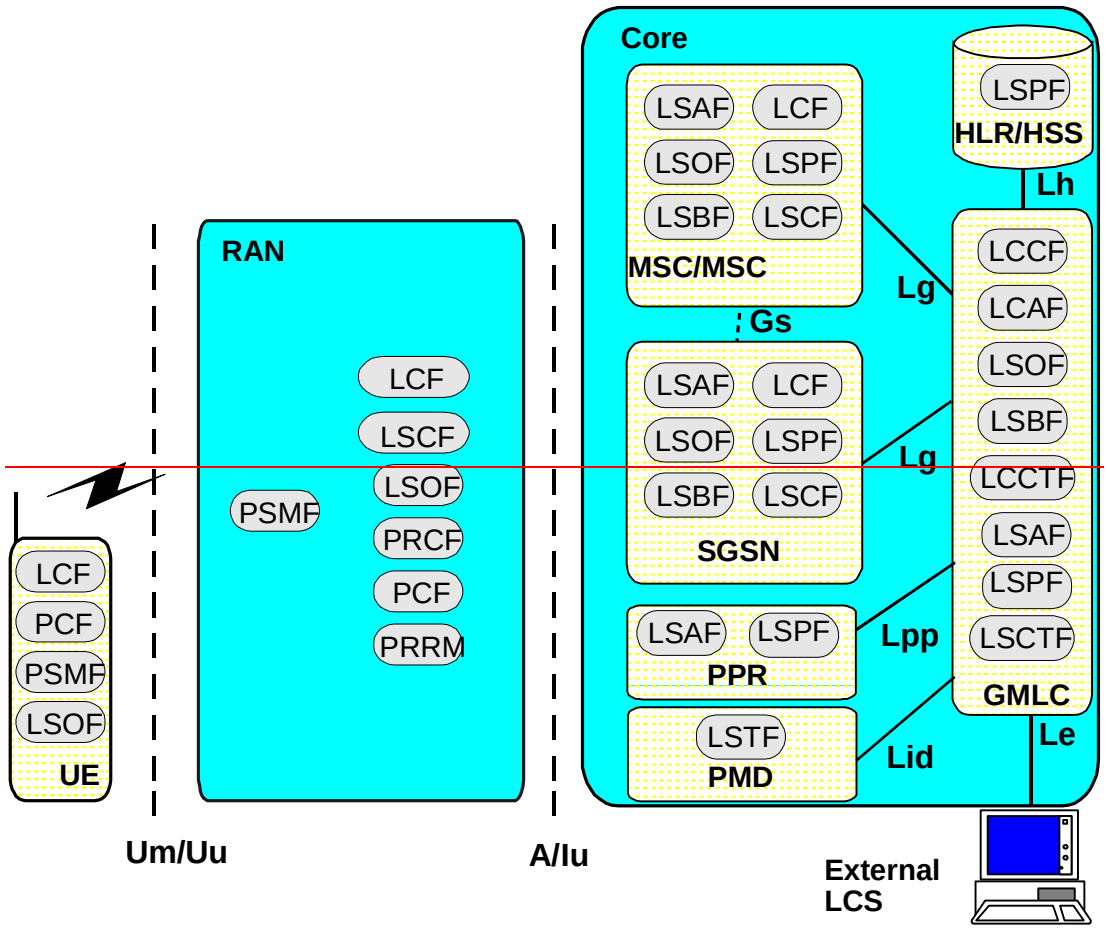


Figure 6.2: Generic LCS Logical Architecture

***** Next modified clause *****

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

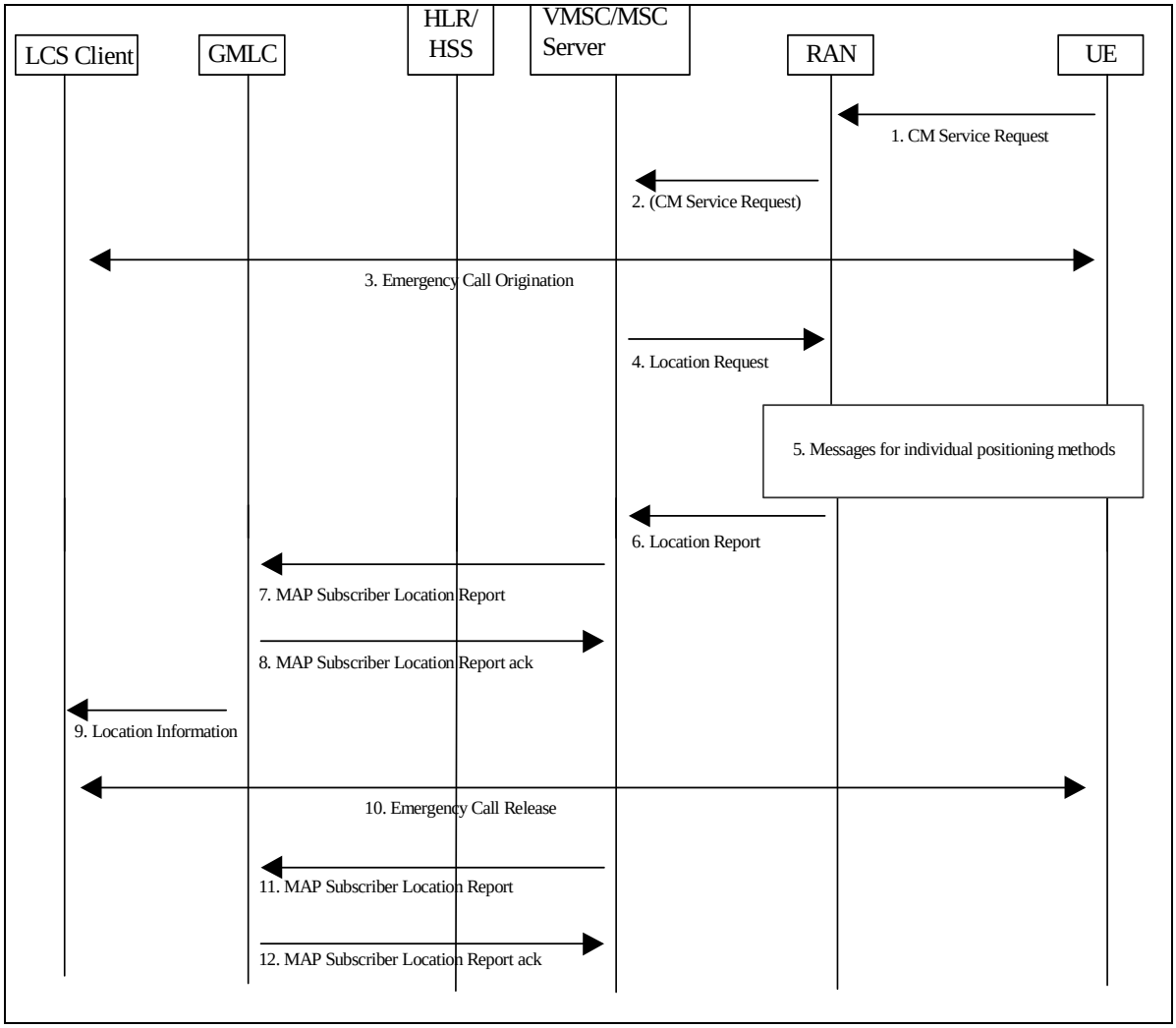


Figure 9.4: Positioning for a NI-LR Emergency Service Call

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 determines based on the serving cell the appropriate emergency services client. The VMSC/MSC server, RAN and UE continue the normal procedure for emergency call origination towards ~~the appropriate~~ that 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. If the serving cell serves an area that contains the service domain of multiple emergency services clients, the VMSC/MSC server may delay call setup and invoke location based routing procedures described in section 9.1.5A. 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~~ or NA-ESRK in North America).

4) At any time after step ~~1~~2, 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].

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 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, 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].

***** New clause *****

9.1.5A NI-LR using Location Based Routing – applicable to North American Emergency Calls only

Figure 9.4A illustrates positioning for an emergency service call using location based routing.

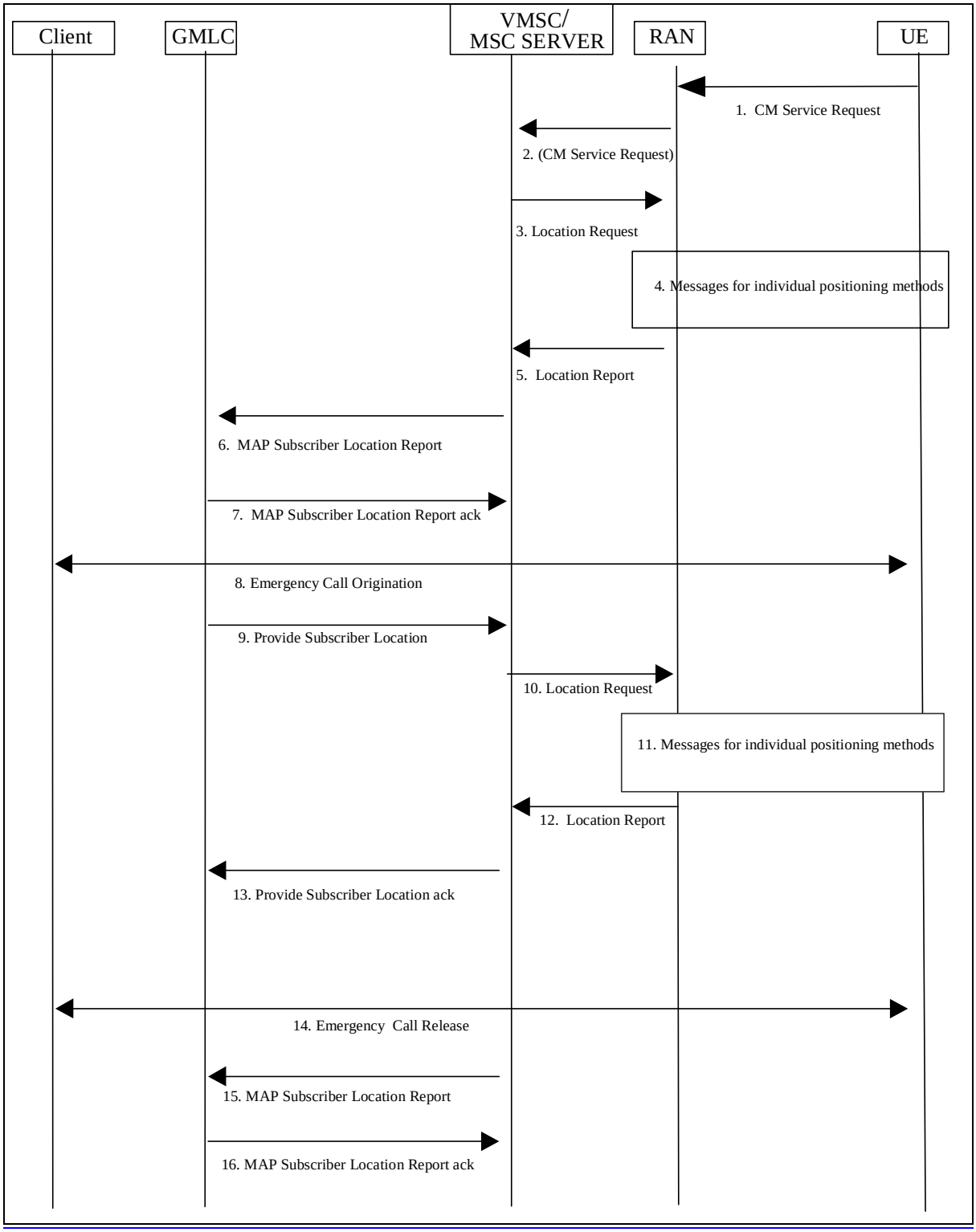


Figure 9.4A: Positioning for a NI-LR Emergency Service Call using Location Based Routing

9.1.5A.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 VMSC/MSC server determines that the serving cell serves an area that contains portions of multiple emergency services zones. Therefore, the VMSC/MSC server delays call setup and initiates procedures to obtain the UE's location for routing the emergency call to the emergency services LCS client. The VMSC/MSC server sends a Location Request message to RAN associated with the UE's current location area. This message includes the type of location information requested, the UE's location capabilities and a QoS with low delay and low horizontal accuracy.

9.1.5A.2 Positioning Measurement Establishment Procedure

4) 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].

9.1.5A.3 Location Calculation and Release Procedure

5) 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. If a failure is received, the VMSC/MSC server initiates emergency call setup using the normal NI-LR procedures.

6) The VMSC/MSC server sends a MAP Subscriber Location Report to a GMLC associated with the emergency services client to which the emergency call will be sent. This message shall carry any location estimate returned in step 5, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE. The message shall also indicate the event that triggered the location report. Any NA-ESRD and NA-ESRK that was assigned by the VMSC/MSC server shall be included. The message shall also include a request for an NA-ESRK value based on the UE position.

7) The GMLC translates the location estimate into a zone identity and assigns a NA-ESRK, which was requested by the VMSC/MSC server. The GMLC shall include the NA-ESRK value in the MAP Subscriber Location Report ack and send it to the VMSC/MSC server. The GMLC stores the assigned NA- ESRK and any NA-ESRD that was sent by the VMSC/MSC server in step 6.

9.1.5A.4 Location Preparation Procedure

8) 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. Call setup information sent into the PSTN may include the UE location plus information that will enable the emergency service provider to request UE location at a later time (NA-ESRD or NA-ESRK in North America). The NA-ESRK used shall be the one received from the GMLC. If a NA-ESRK is not received from the GMLC then the VMSC/MSC server shall use the default NA-ESRK for the call as in 9.1.5.1 step 3.

9) At any time after step 6, the GMLC may send a MAP Provide Subscriber Location message to the VMSC/MSC server. This message includes a QoS with higher delay and higher horizontal accuracy required for an emergency call.

   If the GMLC is capable of determining whether the initial location satisfies the higher accuracy requirements for an emergency call, then the GMLC may not need to request for a higher accuracy location.

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

9.1.5A.5 Positioning Measurement Establishment Procedure

11) same as step 4.

9.1.5A.6 Location Calculation and Release Procedure

12) same as step 5.

13) The VMSC/MSC server returns the location information and its age to the GMLC. The GMLC shall replace the previously stored low accuracy location information with the higher accuracy information for later retrieval by the emergency services LCS client.

14) same as step 10 for normal NI-LR.

15) same as step 11 for normal NI-LR.

16) same as step 12 for normal NI-LR.

3GPP TSG-SA WG 2 Meeting #33
Sophia Antipolis, France, 7–11 July 2003

Tdoc ⌘S2-032723

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **197** ⌘ **rev** **1** ⌘ Current version: **6.4.0** ⌘

*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:	⌘	Pseudonym address and emergency identification
Source:	⌘	Siemens
Work item code:	⌘	LCS2
Date:	⌘	11/07/2003
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:	⌘	The definition on how to use PMD address in association with a pseudonym is described incomplete. The description on how to use the identities for emergency calls in claues 9.1.3 is unclear.
Summary of change:	⌘	The description for the usage of the PMD address has been completed. The usage of the emergency identities has been clarified.
Consequences if not approved:	⌘	The definition of how to use PMD address in association with a pseudonym and the usage of emergency identities in clause 9.1.3 remains unclear

Clauses affected:	⌘	6.4.2, 9.1.3

	Y	N		
Other specs affected: ⌘		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.

********** 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 address of the network element that issued the pseudonym, i.e. the PMD address, shall either be attached to the pseudonym, if required, ~~-~~or this address can be deduced ~~this address~~ from the pseudonym~~-~~. The H-GMLC address may also either be attached to the pseudonym or 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 E.

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

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].

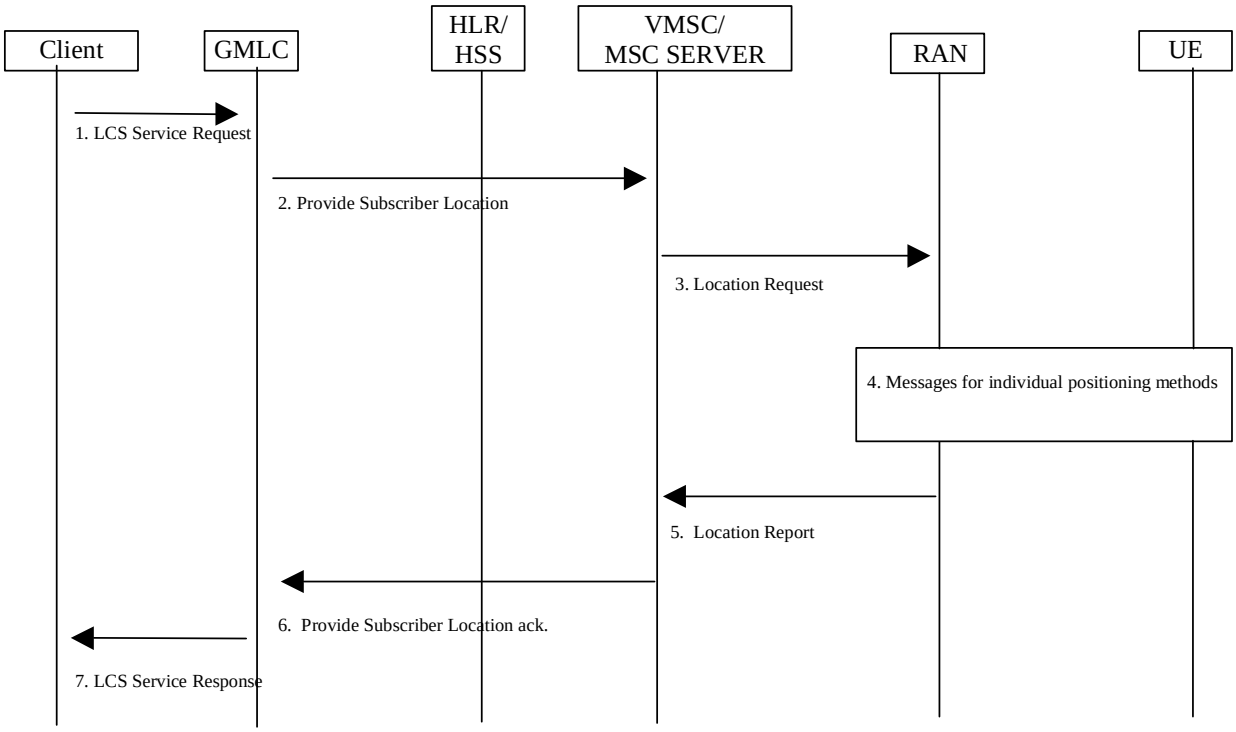

Figure 9.3: Positioning for a Emergency Services MT-LR without HLR Query

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~~ – either NA-ESRK or both of 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 9 for a normal CS-MT-LR.

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

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 187 ⌘rev 3 ⌘ Current version: 6.4.0 ⌘

*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:	⌘	Positioning of SIM-less emergency service calls
Source:	⌘	Nokia
Work item code:	⌘	LCS2 ***Date:*** ⌘ 11.7.2003
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:	⌘	The current TS 23.271 does not define how to handle the positiong for an emergency service call made without a SIM card. The problem of positioning a SIM-less emergency call is that the emergency center is not able to relate the emergency call to the location estimate of the target UE, in case the location estimate was not sent in the call setup procedure.
Summary of change:	⌘	In order to map the emergency call with the corresponding location estimate, there is a need to send a common UE identity in the call setup and also together with the location estimate. It is proposed that the non-dialable callback number (as also defined in the J-STD-036) should be used for this purpose.
Consequences if not approved:	⌘	TS 23.271 will not define a mechanism how to locate a SIM-less emergency call.

Clauses affected:	⌘	3.1 6.4 9.1.3 9.1.5

	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 clause >>

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) required after a specific event has occurred. The event may or may not occur 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.

Non-dialable call back number: In case of a SIM-less emergency call, a non-dialable callback number shall be used to identify the target UE. The format and structure of the non-dialable callback number is according to national or regional regulations.

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): 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].

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 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 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).

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 changed clause >>

6.4 Addressing the target UE for LCS purposes

6.4.1 Verinyms for the target UE

It shall be possible to address and indicate the target UE using MSISDN. It may be possible in certain cases to address the target UE using IP address when a static or dynamic IP address (IPv4 or IPv6) has been allocated for the UE.

In the mobile terminated location request procedures in the PS domain (as well as in the CS domain), the target UE is identified using either MSISDN or IMSI.

NOTE: It is recognized that IP-addressing of the target UE is only possible when there is an active PDP context established between the target UE and the external LCS client. Using the established PDP context, the LCS client can request the target UE, as identified with the IP address it currently uses, to initiate a Mobile originated location request. The actual signaling exchange between the LCS Client/server and the target UE or the user of the target UE is outside the scope of this specification. The resulting MO-LR is performed as specified in this document.

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 address of the network element that issued the pseudonym, i.e. the PMD address, shall either be attached to the pseudonym, if required or can deduce this address from the pseudonym . The H-GMLC address may also either be attached to the pseudonym or 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 E.

6.4.3 Non-dialable callback numbers

In case of a SIM-less emergency call, a non-dialable callback number shall be used to identify the target UE. The format and structure of the non-dialable callback number is according to national or regional regulations. The non-dialable callback number in North America shall, according to J-STD-036 [32], be the digits 911 + the last 7 digits of IMEI expressed in decimal numbers.

Editorial note: The use of non-dialable callback numbers in other parts of the world is for further study. The non-dialable callback number should adopt random numbering, if not otherwise unique.

<< Next changed clause >>

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].

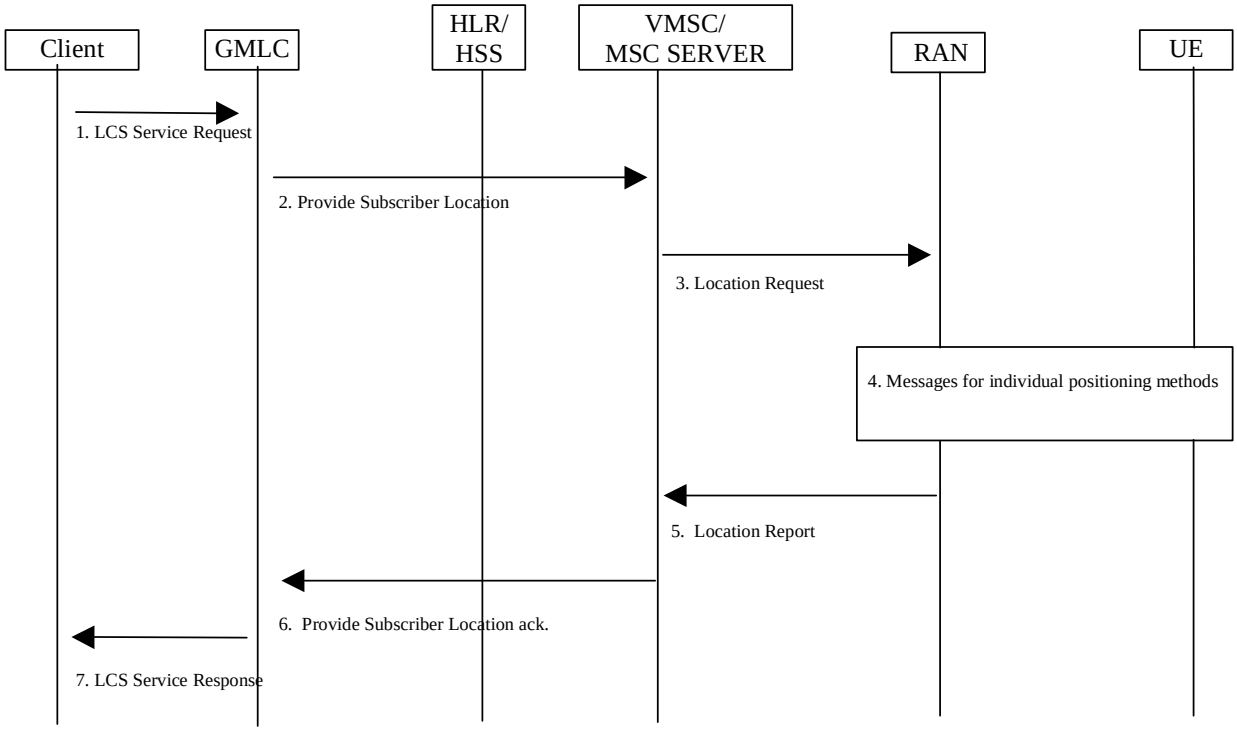

Figure 9.3: Positioning for a Emergency Services MT-LR without HLR Query

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 case a SIM-less UE is used to make the emergency call, the MSISDN may be populated with a non-dialable callback number as specified in clause 6.4.3.

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 9 for a normal CS-MT-LR.

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

<< Next changed clause >>

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

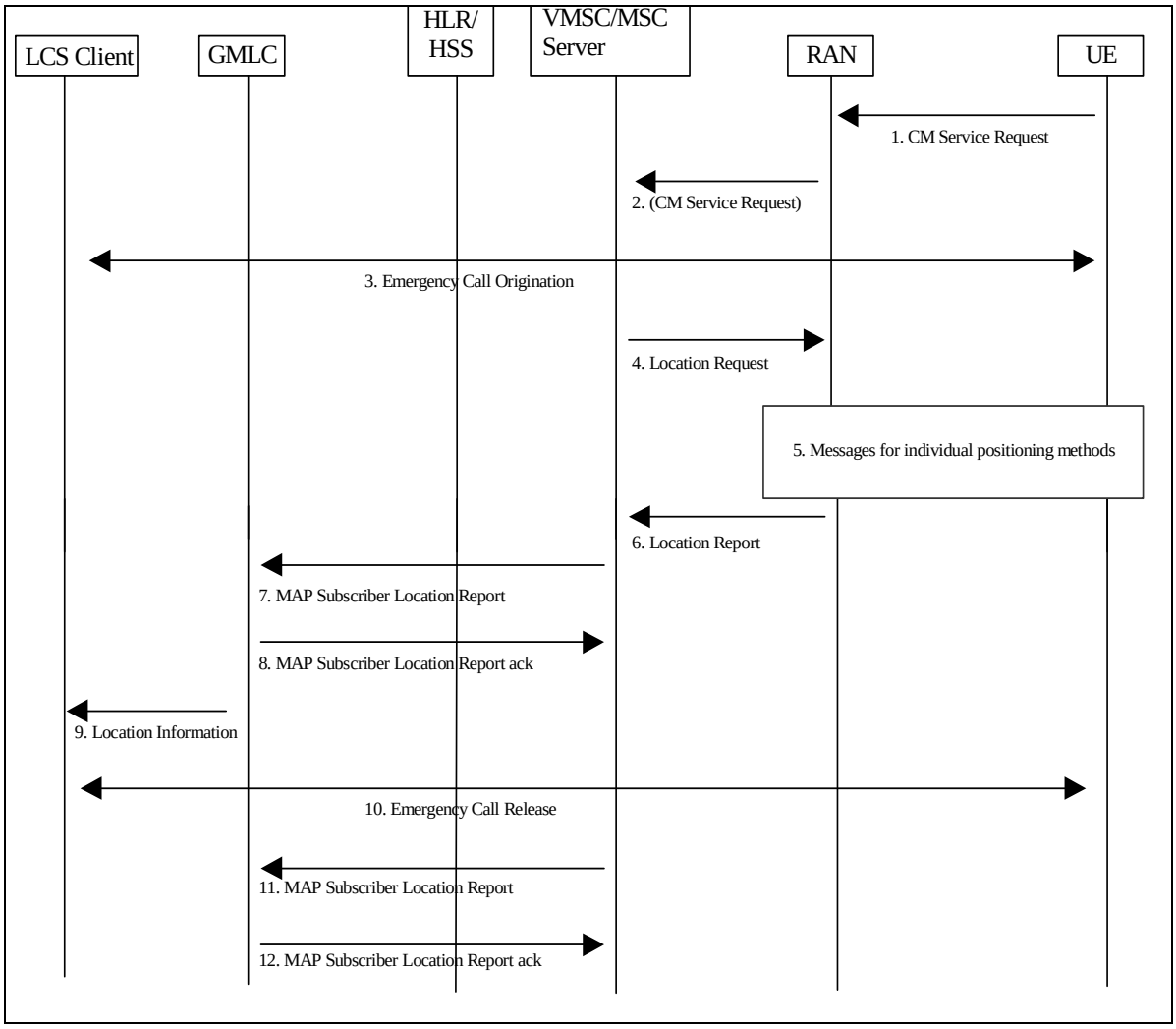

Figure 9.4: Positioning for a NI-LR Emergency Service Call

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].

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 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, and the information about the positioning method used. In case a SIM-less UE is used to make the emergency call, the MSISDN may be populated with a non-dialable callback number as specified in clause 6.4.3. 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].

3GPP TSG SA WG2 Meeting #34 **Tdoc ⌘S2-032836**
Brussels, Belgium, August 18-22, 2003 **(Revised S2-03123, S2-033119, S2-032985)**

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **201** ⌘ **rev** **3** ⌘ Current version: **6.4.0** ⌘

*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:	⌘	An additional parameter to limit the LCS client
Source:	⌘	Huawei, China Mobile
Work item code:	⌘	LCS2
Date:	⌘	19/08/2003
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:	⌘	In the current TS 23.271 V6.4.0 Clause 5.5.1, it is permitted that the LCS client can send an LCS Request for location information of one or more UEs. To fulfil this requirement, OMA had defined a parameter “msid range”in the LIF_TS_101_v3.0.0, with which the LCS client can request the location information of a batch of target UEs. In order to limit the number of the target UE in a single request, the access parameter of “maximum number of subscribers allowed in a single LCS request” is stated in the current TS 23.271 clause 5.4.1.2.2. However, there is no corresponding handling with this parameter in the MT-LR procedure.
Summary of change:	⌘	The procedure for checking the Maximum Target UE Number is added to clause 9.1.1, and a new parameter Maximum Target UE Number is added to Table 10.7.
Consequences if not approved:	⌘	The LCS server can not limit the number of the target UEs in an LCS request.

Clauses affected:	⌘	9.1.1, 10.3.1
Other specs affected:	⌘	Y / N ☐ / ☒ Other core specifications ☐ / ☒ Test specifications ☐ / ☒ O&M Specifications
	⌘	
Other comments:	⌘	This change impacts on the MLP procedure in OMA

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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.

>>Frist Modified Section

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

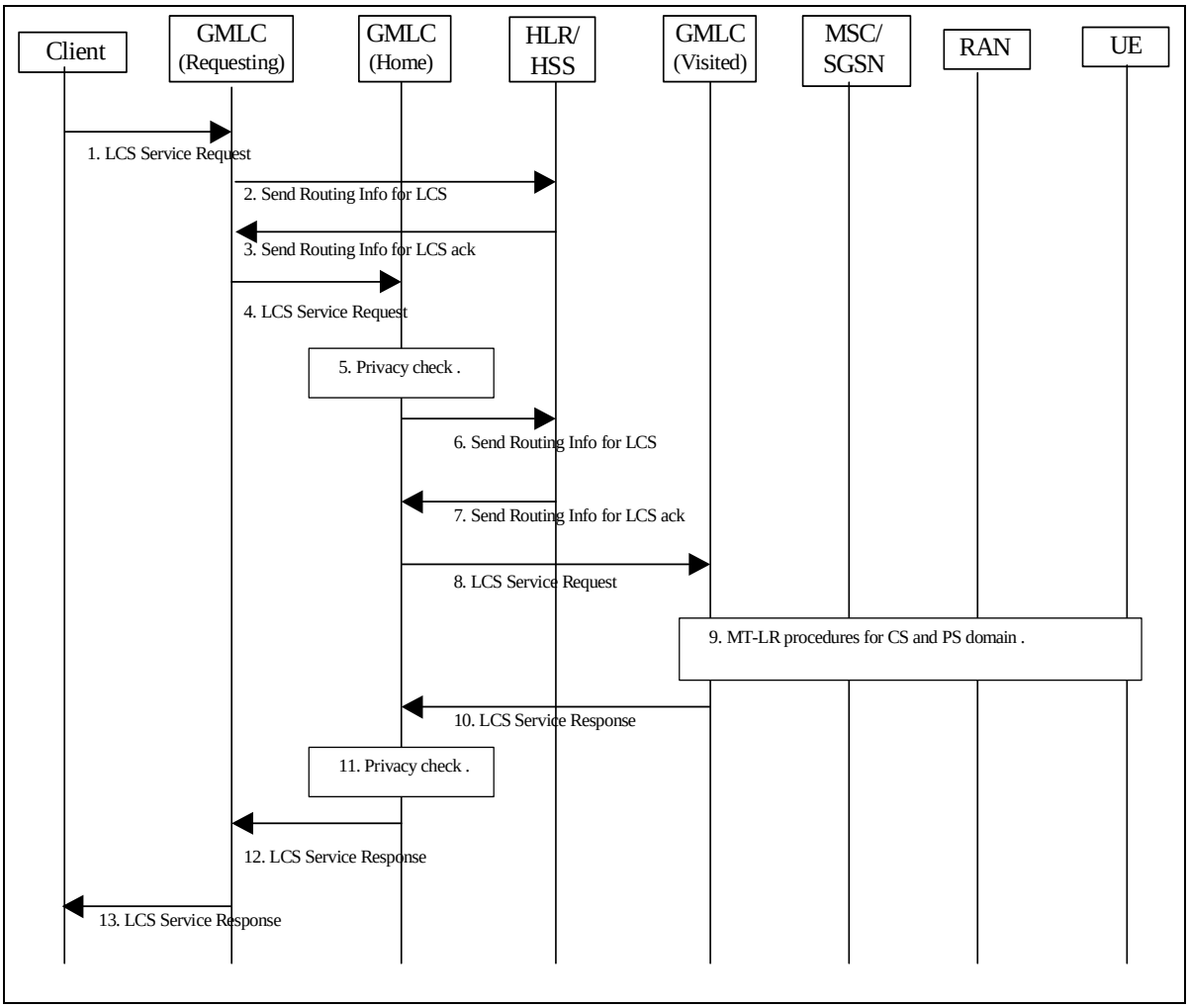

Figure 9.1: General Network Positioning for a MT-LR

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. In case the location is requested for more than one UE, the R-GMLC should verify whether the number of Target UEs in the LCS request is equal or less than the Maximum Target UE Number of the LCS client. If the Maximum Target UE Number is exceeded, the R-GMLC should respond to the client with proper error cause.

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. 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), the H-GMLC 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 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 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 does not know 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 H-GMLC shall send 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. 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.

>>Second Modified Section

10.3 GMLC

10.3.1 LCS Data in the GMLC for a LCS Client

The GMLC holds data for a set of external LCS clients that may make call related or non-call related CS-MT-LR/PS-MT-LR requests to this GMLC. The permanent data administered for each LCS client is as follows.

Table10.7: GMLC Permanent Data for a LCS Client

LCS Client data in GMLC	Status	Description
LCS Client Type	M	Identifies the type LCS client from among the following: - Emergency Services - Value Added Services - PLMN Operator Services - Lawful Intercept Services
External identity	O	A list of one or more identifiers used to identify an external LCS client. The identity may be used when making an MT-LR and/or MO-LR. The format of the identity is international E.164 addresses. Each external identity shall be associated with a logical client name.
Authentication data	M	Data employed to authenticate the identity of an LCS client – details are outside the scope of the present document
Call/session related identity	O	A list of one or more international E.164 addresses, which are used to make calls by mobile subscribers, or APN-NIs (see NOTE) to identify the client for a call related MT-LR In case the LCS client was reached via IN or abbreviated number routing (e.g. toll free number or emergency call routing), the E.164 number(s) stored in the GMLC shall be the number(s) that the UE has to dial to reach the LCS Client. In these cases the E.164 number is not to be in international format. The country in which the national specific number(s) is (are) applicable is (are) also stored (or implied) in this case. Each call related identity may be associated with a specific external identity. Each call/session-related identity shall be associated with a logical client name.
Internal identity	O	Identifies the type PLMN operator services and 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 This identity is applicable only to PLMN Operator Services.
Client name	O	An address string which is associated with LCS client's external identity (i.e., E.164 address). See note 2.
Client name type	O	Indication what is the type of the LCS client name. The type of the LCS client name can be one of the following: • Logical name • MSISDN • E-mail address[33] • URL[33] • SIP URL[34] • IMS public identity[35]
Override capability	O	Indication of whether the LCS client possesses the override capability (not applicable to a value added and PLMN operator service)
Authorized UE List	O	A list of MSISDNs or groups of MSISDN for which the LCS client may issue a non-call related MT-LR. Separate lists of MSISDNs and groups of MSISDN may be associated with each distinct external or non-call related client identity.
Priority	M	The priority of the LCS client – to be treated as either the default priority when priority is not negotiated between the LCS server and client or the highest allowed priority when priority is negotiated
QoS parameters	M	The default QoS requirements for the LCS client, comprising: - Accuracy - Response time Separate default QoS parameters may be maintained for each distinct LCS client identity (external, non-call related, call related)

Service Coverage	O	A list of country codes where the LCS client offers its location services.
Allowed LCS Request Types	M	Indicates which of the following are allowed: - Non-call related CS-MT-LR/PS-MT-LR - Call/session related CS-MT-LR/PS-MT-LR - Specification or negotiation of priority - Specification or negotiation of QoS parameters - Specification or negotiation of Service Coverage parameter - Request of current location - Request of current or last known location
Local Co-ordinate System	O	Definition of the co-ordinate system(s) in which a location estimate shall be provided – details are outside the scope of the present document
Access Barring List(s)	O	List(s) of MSISDNs or groups of MSISDN for which a location request is barred
Service Identities	O	List of service identities allowed for the LCS client.
Maximum Target UE Number	O	The maximum number of the Target UEs in one LCS request. For a specific LCS Client, this parameter may have different values for different service identities.

NOTE 1: The LCS Client is identified with E.164 number or APN-NI. APN-NI is specified in TS 23.003.

NOTE 2: The LCS Client name should not contain two equal signs, because those characters are used to separate LCS client name from Requestor ID when GLMC includes them into the same field.

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **203** ⌘ **rev** **32** ⌘ Current version: **6.4.0** ⌘

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

Title:	⌘	Introduction of location estimate in the change of area event procedure
Source:	⌘	Huawei, ChinaMobile
Work item code:	⌘	LCS2
Date:	⌘	08/08/2003
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 the current specification TS 23.271 v6.4.0, the definition of Change of Area states "The change of area event report shall contain an indication of the event occurrence. The location estimate may be included in the report." However, in the current change of area event procedure, there is no corresponding mechanism to provide the subscriber's location estimate in the change of area event report.
Summary of change:	⌘	An indication of the requested location estimate of the target UE is added to the LCS Service Request. In the change of area event procedure, when the R-GMLC receives the change of the area event report, it may initiate another MT-LR procedure according to the indication of the requested location estimate in the request.
Consequences if not approved:	⌘	The requirement of "The change of area event report may inculde the location estimate of the target UE" can't be fulfilled.

Clauses affected:	⌘	5.5.1, 9.1.9			
		Y	**N**		
Other specs Affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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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 >>

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;
    d) Indication of the requested location estimate; i.e. whether the location estimate of the target UE should be contained in the change of area event report;
- Start time, stop time and interval, applicable to periodical 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;
- 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.

<< Next modified 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

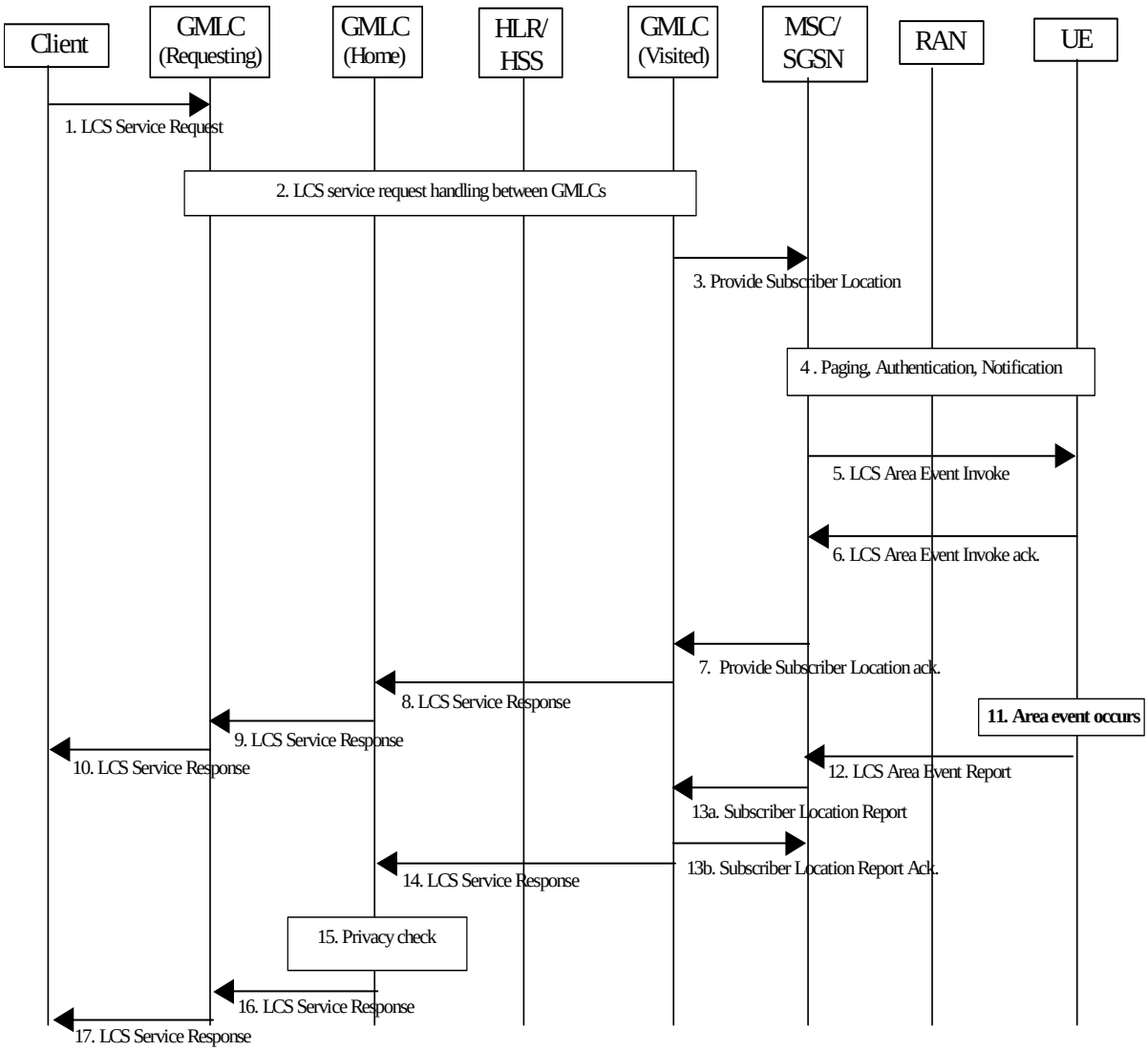

Figure 9.6d: Deferred MT-LR procedure for the Area event

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. If indication of the requested location estimate is included in the area event request, the R-GMLC should record this indication and any relevant parameters such as QoS. 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) If the R-GMLC finds the indication of the requested location estimate is stored, the R-GMLC should generate a new immediate LCS Service Request with the QoS specified in the original request. Then the R-GMLC sends the new request to the H-GMLC and waits the result the location request. The H-GMLC performs the privacy check as described in clause 9.1.1, and the subsequent procedures in clause 9.1.1 are continued.

The R-GMLC sends the LCS Service Response to the LCS client. If the location estimate of the target UE is requested in the request and the location estimate was successfully obtained, the R-GMLC shall put the obtained

location estimate into the LCS Service Response. If the location estimate of the target UE is requested in the request but the location estimate could not be obtained, the R-GMLC sends the LCS Service Response without the location estimate. 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.

<< End of changed clause >>

Tdoc ⌘ S2-032838
(Revised S2-033022, S2-032833)

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 205 ⌘rev 2 ⌘ Current version: 6.4.0 ⌘

*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:	⌘	CR of synchronous & asynchronous procedures in GMLC
Source:	⌘	China Mobile, Huawei
Work item code:	⌘	LCS2
Date:	⌘	August19,.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 the current MLP and RLP, when the LCS Client initiates an LCS request, with a parameter of "Request Type" in the request, it may indicate either synchronous or asynchronous mechanism in the Lr interface should be applied. Similarly, the R-GMLC/H-GMLC also can send this parameter in the LCS Request to notify the H-GMLC/V-GMLC which interaction mechanism should be applied. However, in the current TS 23.271, there is no corresponding description about synchronous or asynchronous mechanism. This inconsistency should be revised.
Summary of change:	⌘	A parameter of "Request Type" is added to the LCS Service Request both on the Le interface and Lr interface. The corresponding handling of the "Request Type" is added to the MT-LR procedure.
Consequences if not approved:	⌘	The MLP and RLP are still incositent with the current TS 23.271 about the synchronous or asynchronous mechanism on the Le and Lr interfaces.

Clauses affected:	⌘	3.1,5.5.1,5.5.2, 5.6.1, 5.6.2

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

Other comments:	⌘	OMA/LIF TS 101 is probably affected.

How to create CRs using this form:
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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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<< First changed clause >>

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) required after a specific event has occurred. The event may or may not occur 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): 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].

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 verifies pseudonyms to verinyms

Request id: identity which is used to identify the correspondence of a location request to multiple responses when the Response method is ASYNC. Each receiving GMLC (R-GMLC or V-GMLC or H-GMLC) allocates and maintains the Request id to identify each ASYNC location request, and includes it in the responses to the source entity of the location request (i.e. LCS client or GMLC).

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.

Response method: method how a GMLC, which receives a location request message from another entity (i.e. LCS client or GMLC), responds to the location request. There are two methods, synchronous (SYNC) and asynchronous (ASYNC). When the requesting entity wishes multiple responses (either about one or several target UE's location) to a single location request the procedure is ASYNC and when the requesting entity wishes a single response the procedure is SYNC. The source entity of the location request (i.e. LCS client or GMLC) can choose a preferred method and informs the method to the receiving GMLC. However, the selection of the method used is made by the receiving GMLC and when the ASYNC method is selected the Request id is notified to the source entity. The receiving GMLC can turn a SYNC request into an ASYNC procedure, e.g. in an overload situation, and the source entity (i.e. LCS client or GMLC) should be able to receive multiple responses even though the request was SYNC.

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 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).

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.

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;
- Response method (SYNC or ASYNC), 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 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;
- 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;

- 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, is within or leaves the Geographical area, if needed;
- Acknowledgement for a deferred location request, if needed;
- Request id, if needed.

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

<< Next changed 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

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;
- Response method (SYNC or ASYNC), 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;
- Indication when UE enters, is within or leaves the geographical area, if needed;
- 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;
- Request id, if needed.

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

< End of changed clause >>

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 207 ⌘rev - ⌘ Current version: 5.7.0 ⌘

*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: ⌘	Removing PDP addressing of the target UE	
Source: ⌘	Nokia	
Work item code: ⌘	LCS2	**Date:** ⌘ 12.8.2003
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: ⌘	According to the specification the GMLC can identify the target UE using the PDP address of the target UE in the location request it sends to SGSN. This is not possible in practise and the specification is in contradiction with stage 3.
Summary of change: ⌘	PDP address as an identity of the target UE is deleted. The corresponding note that the issue is FFS is deleted.
Consequences if not approved: ⌘	The stage 2 description in 23.271 would be wrong and in contradiction with the corresponding stage 3 specifications.

Clauses affected: ⌘	9.1 9.1.6 9.1.7.2				
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 >>

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

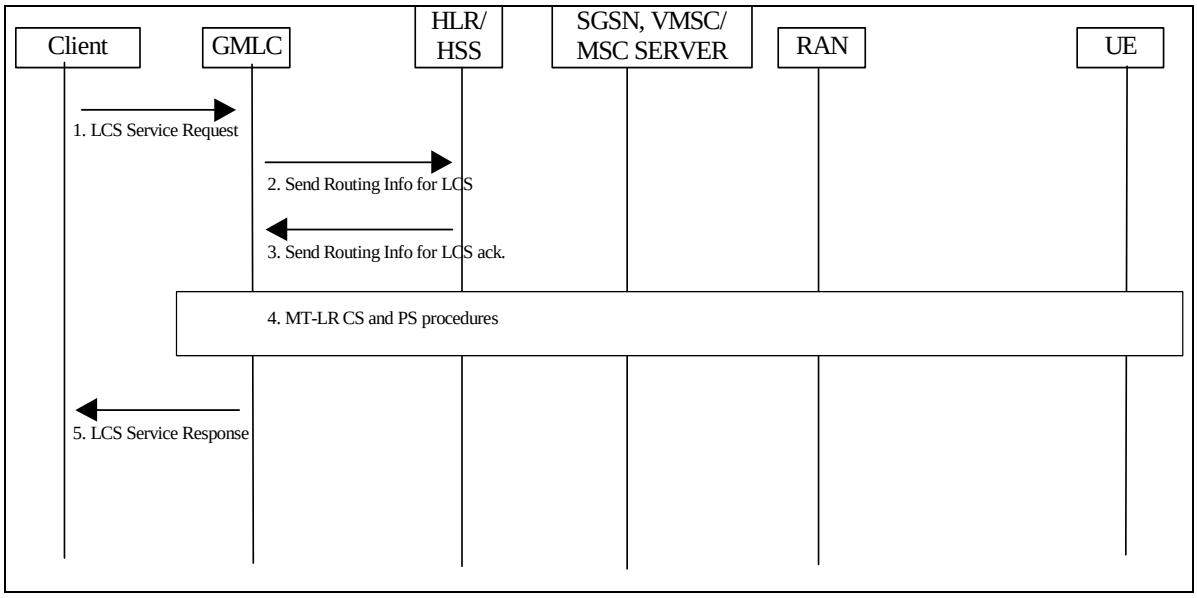

Figure 9.1: General Network Positioning for a MT-LR

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.

<< Next changed clause >>

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.

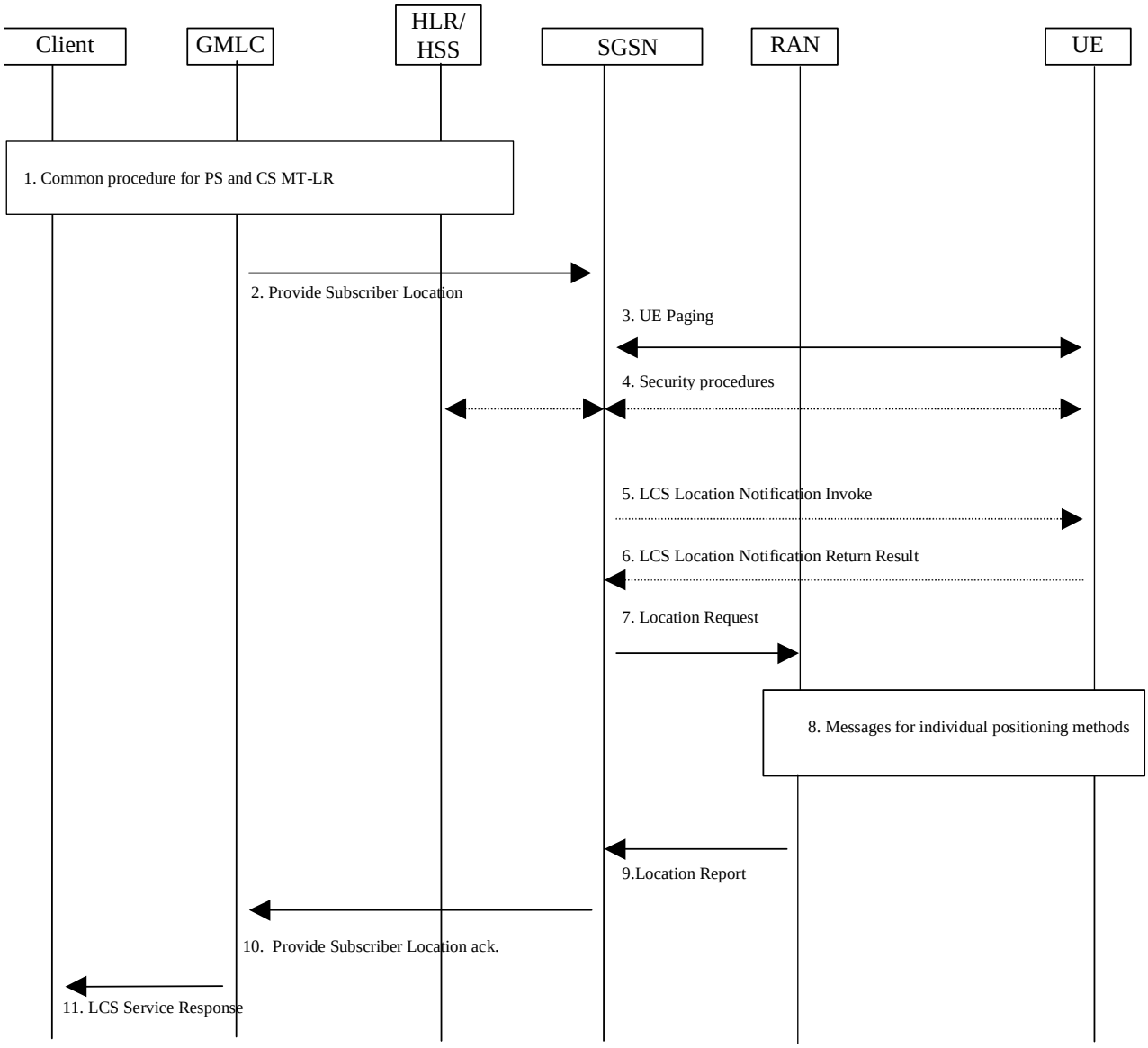

Figure 9.5: General Network Positioning for Packet Switched MT-LR

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.

<< Next changed clause >>

9.1.7.2 Location Calculation and Release Procedure

3) When a location estimate best satisfying the requested QoS has been obtained , the RAN returns a Location Report to the SGSN. This message carries the location estimate that was obtained. If a location estimate was not succesfully obtained , a failure cause is included in the Location Report.

4) The SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 1 carrying the MSISDN ~~or PDP address~~ of the UE, the identity of the LCS client, the event causing the location estimate (NI-LR-PS) and the location estimate and its age.

5) The GMLC shall acknowledge receipt of the location estimate provided that it serves the identified LCS client and the client is accessible.

6) The GMLC may transfer the location information to the LCS client either immediately or upon request from the client.

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 208 ⌘rev - ⌘ Current version: 6.4.0 ⌘

*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: ⌘	Removing PDP addressing of the target UE	
Source: ⌘	Nokia	
Work item code: ⌘	LCS2	**Date:** ⌘ 12.8.2003
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: ⌘	According to the specification the GMLC can identify the target UE using the PDP address of the target UE in the location request it sends to SGSN. This is not possible in practise and the specification is in contradiction with stage 3.
Summary of change: ⌘	PDP address as an identity of the target UE is deleted. The corresponding note that the issue is FFS is deleted.
Consequences if not approved: ⌘	The stage 2 description in 23.271 would be wrong and in contradiction with the corresponding stage 3 specifications.

Clauses affected: ⌘	9.1 9.1.6 9.1.7.2				
		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 >>

9.1 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

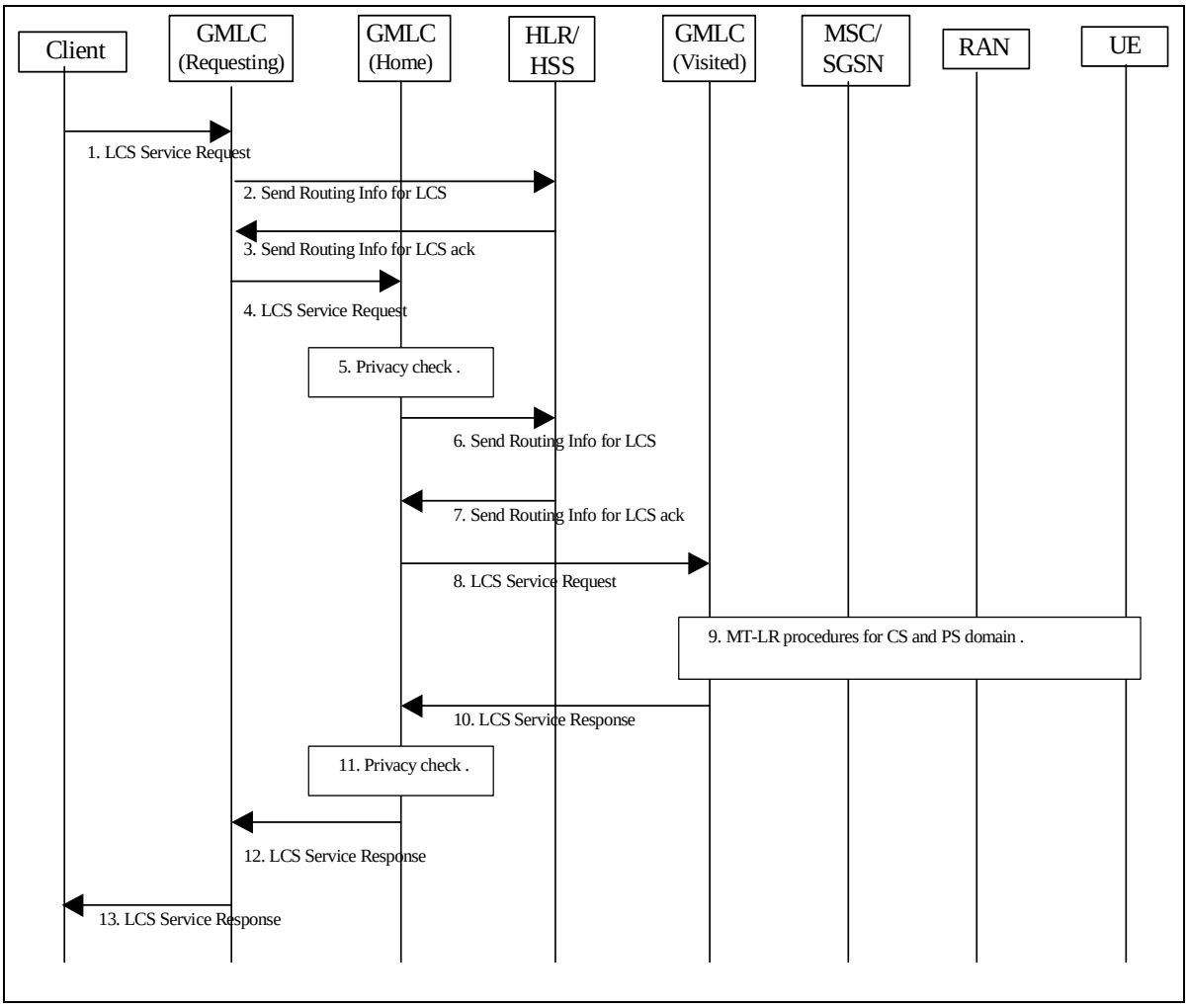

Figure 9.1: General Network Positioning for a MT-LR

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 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. 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), the H-GMLC 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 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 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 does not know 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 H-GMLC shall send 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. 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 changed clause >>

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.

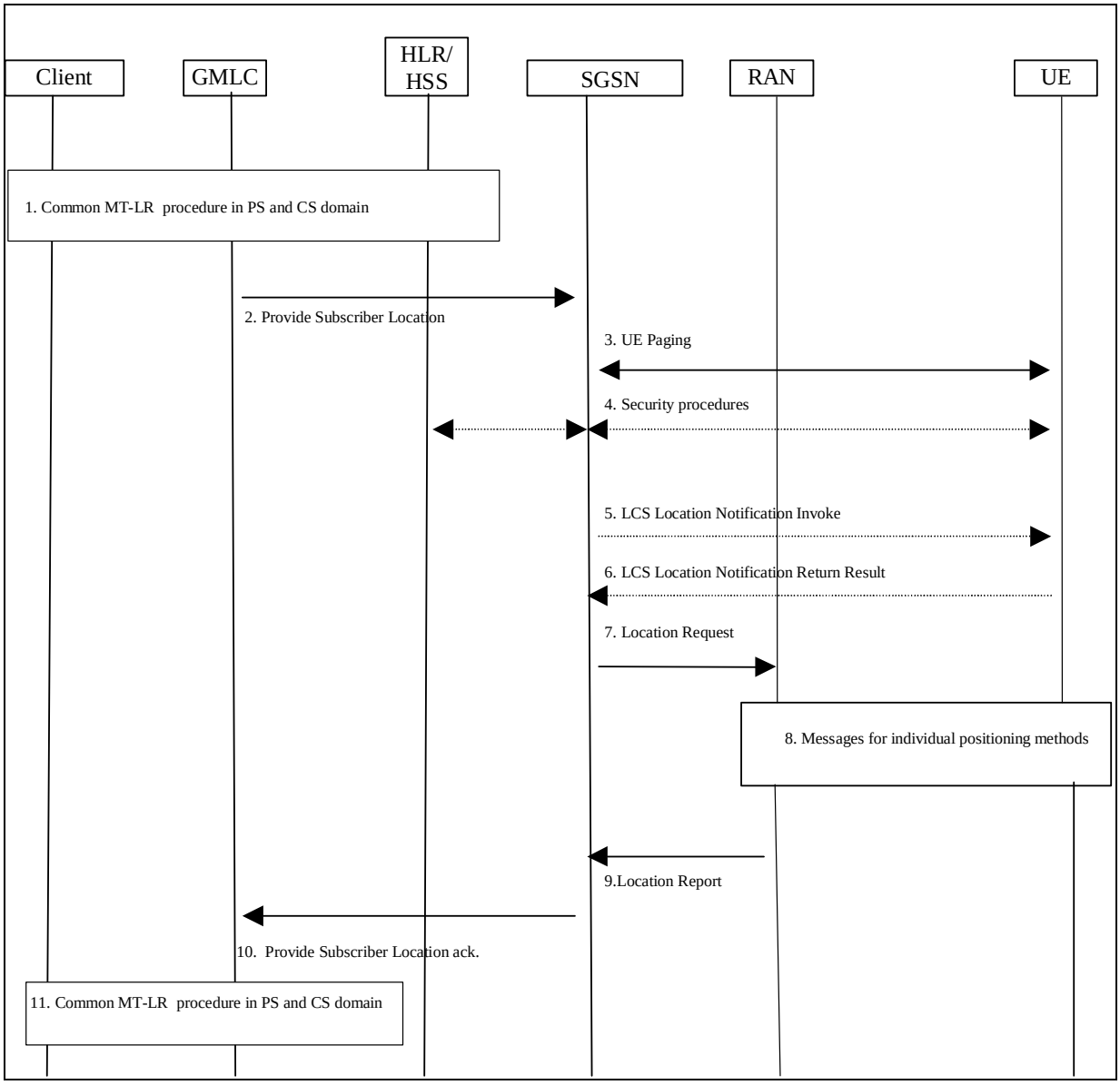

Figure 9.5: General Network Positioning for Packet Switched MT-LR

<< Next changed clause >>

9.1.7.2 Location Calculation and Release Procedure

3) When a location estimate best satisfying the requested QoS has been obtained-, the RAN returns a Location Report to the SGSN. This message carries the location estimate that was obtained. If a location estimate was not succesfully obtained-, a failure cause is included in the Location Report.

4) The SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 1 carrying the MSISDN ~~or PDP address~~ of the UE, the identity of the LCS client, the event causing the location estimate (NI-LR-PS) and the location estimate and its age.

5) The GMLC shall acknowledge receipt of the location estimate provided that it serves the identified LCS client and the client is accessible.

6) The GMLC may transfer the location information to the LCS client either immediately or upon request from the client.

Tdoc ⌘ S2-033039
(Revised S2-032652, S2-032521)

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 190 ⌘rev 2 ⌘ Current version: 6.4.0 ⌘

*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:	⌘	Clearing editorial and other notes
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	12.8.2003
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:	⌘	TS 23.271 contains outdated editorial notes and other notes that should be deleted or updated. Some editorial corrections are also seen needed.
Summary of change:	⌘	Outdated editorial notes and other notes are deleted or moved into the main text of the specification. Some editorial changes.
Consequences if not approved:	⌘	TS 23.271 would contain outdated editorial notes and other notes which are incorrect or misleading.

Clauses affected:	⌘	3.3 4.3.2 5.3.1 6 6.2 6.3.2 7.2 8.1.1.3 8.1.2 8.2 9.1 9.1.1A 9.1.1.1 9.1.1.2 9.1.1.3 9.1.2.1 9.1.5.3 9.1.6 9.1.7.2 9.1.8.2 9.1.8.3 10.3.2 10.5

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

Other comments: ⌘

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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 >>

3.3 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
LSCTF	Location System Co-ordinate Transformation 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].

<< Next changed clause >>

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.

<< Next changed clause >>

5.3.1 External Location Client Function (LCF)

The Location Client Function (LCF) provides a logical interface between the LCS client and the LCS server.

This function is responsible for requesting location information for one or more UEs, with a specified "QoS" and receiving a response, which contains either location information or a failure indicator.

~~[Editor's note: this is only possible if the location request originates in the core network].~~

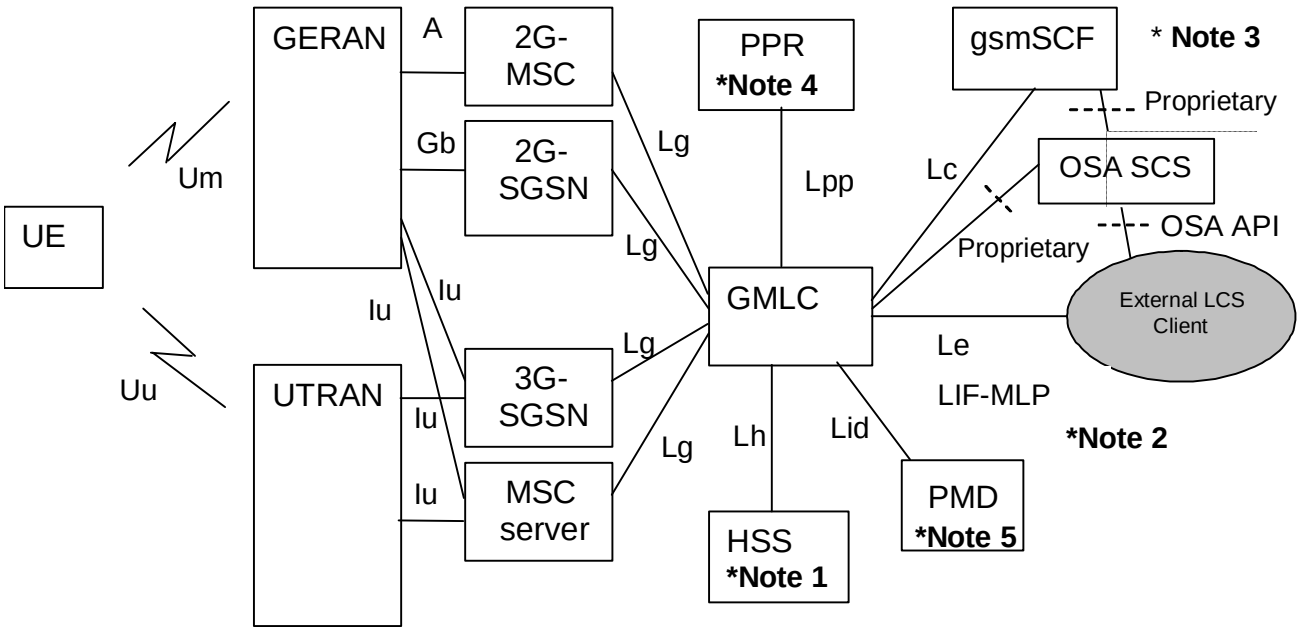
<< Next changed clause >>

6 LCS Architecture

Figure 6.1 shows the general arrangement of the Location Service feature in GSM and UMTS. This illustrates, generally, the relation of LCS Clients and servers in the core network with the GERAN and UTRAN Access Networks. The LCS entities within the Access Network communicate with the Core Network (CN) across the A, Gb and Iu interfaces. Communication among the Access Network LCS entities makes use of the messaging and signaling capabilities of the Access Network.

As part of their service or operation, the LCS Clients may request the location information of UE. There may be more than one LCS client. These may be associated with the GSM/UMTS networks or the Access Networks operated as part of a UE application or accessed by the UE through its access to an application (e.g. through the Internet).

The clients make their requests to a LCS Server. There may be more than one LCS Server. The client must be authenticated and the resources of the network must be co-ordinated including the UE and the calculation functions, to estimate the location of the UE and result returned to the client. As part of this process, information from other systems (other Access Networks) can be used. As part of the location information returned to the client, an estimate of the accuracy of the estimate and the time-of-day the measurement was made may be provided.



NOTE 1: HSS includes both 2G-HLR and 3G-HLR functionality. LCS is included in the overall network architecture in TS 23.002 [20].
NOTE 2: LIF-MLP may be used on the Le interface
NOTE 3: –As one alternative the LCS client may get location information directly from GMLC, which may contain OSA Mobility SCS with support for the OSA user location interfaces. See TS 23.127 [26] and TS 29.198 [27, 28, 29 and 30].
NOTE 4: –The PPR functionality may be integrated in GMLC
NOTE 5: –The PMD functionality may be integrated in GMLC or PPR.

Figure 6.1-1: General arrangement of LCS

<< Next changed 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**

<< Next changed clause >>

6.3.2 LCS Clients, LCS applications and Requestors

There are two classes of LCS Application - Internal applications and External applications. Internal applications represent entities internal to the GSM/UMTS that make use of location information for the (improved) operation of the network. Internal LCS client can be identified by LCS client internal ID. LCS client Internal ID distinguishes the following classes: (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). External applications represent entities (such as Commercial or Emergency services) that make use of location information for operations external to the mobile communications network. External LCS client can be identified by LCS client external ID. The LCS Applications interface to the LCS entities through their Location Client functions (LCF). Location requests from the external LCS clients may be originated by external entities (i.e. Requestor). LCS client should authenticate the Requestor Identity but this is outside the scope of this specification.

LCS client may indicate the type of the Requestor identity in the LCS service request. The type of the Requestor identity can be one of the following:

- Logical name
- MSISDN [17]
- E-mail address [33]

- URL [33]
- SIP URL [34]
- IMS public identity [35]

The LCS Client, LCS applications and Requestors are outside the scope of the present document. However, an external LCS Client may communicate with the LCS Server as specified in [31].

<< Next changed clause >>

7.2 Um and Uu Interfaces

~~NOTE: This chapter may change depending on whether air interface LMU will exists in the logical architecture or not.~~

The Um and Uu interfaces are used to communicate among the LCS entities associated with the BSC and RNC, the UE and the stand-alone Location Measurement Units (LMU). The Um and Uuinterfaces are also used to communicate between the LCS entities in the core network and the UE.

The Um/Uu interfaces may pass measurement requests and results to and from UE or the stand-alone LMU.

The Um/Uu interfaces may also pass location requests from internal or external LCS Clients (Applications) at the UE. Note that these requests may require the services of the LCS entities associated with the core network to authenticate clients and subscriber subscriptions to aspects of the LCS.

The Um/Uu interfaces may also be used for broadcast of information that may be used by the UE or stand-alone LMU for their LCS operations. This may, for example, include timing information about nearby Node-B/BTS transmissions that may assist the UE or LMU in making their measurements. In UTRAN code information may be included.

The Um and Uu interfaces may also pass messages relating to changes or reporting of the data associated with the Location System Operations Function (LSOF) in the UE or the remote LMU.

UTRAN Stage 2 specification TS 25.305 [1] specifies LCS signaling over the Uu interface and GERAN Stage 2 specification TS 43.059 [16] over the Um interface correspondingly.

Message segmentation is specified in GERAN LCS Stage 2, TS 43.059 [16].

<< Next changed clause >>

8.1.1.3 LOCATION State

In this state, the GMLC has sent a location request to the VMSC, MSC Server or SGSN ~~–~~serving the UE to be located and is awaiting a response containing a location estimate. Optionally, location information may also be communicated between GMLCs, located in the same or a different ~~–~~PLMN, via the GMLC to GMLC Lr interface

<< Next changed clause >>

8.1.2 State functionality

8.1.2.1 State Transitions

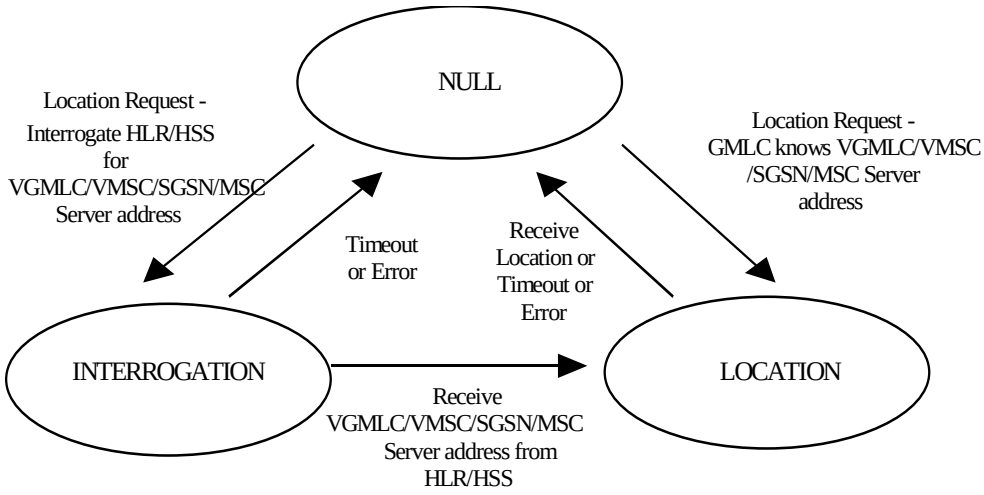


Figure 8.1: State Transitions in the GMLC

Moving from NULL to INTERROGATION state:

If the GMLC does not know any of the following addresses:VMSC, MSC Server, SGSN,V-GMLC address or IMSI when it receives a location service request from some LCS client, it moves from the NULL state to the INTERROGATION state and sends a request to the UE's home HLR/HSS for the VMSC/ MSC Server/ SGSN/V-GMLC –address and IMSI.

<< Next changed clause >>

8.2 State description for VMSC and MSC Server

8.2.1 VMSC and MSC Server States

~~NOTE: Periodic location service may need to be covered in the state descriptions.~~

<< Next changed clause >>

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.

It is noted that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

9.1.1 Common MT-LR procedure in PS and CS domain

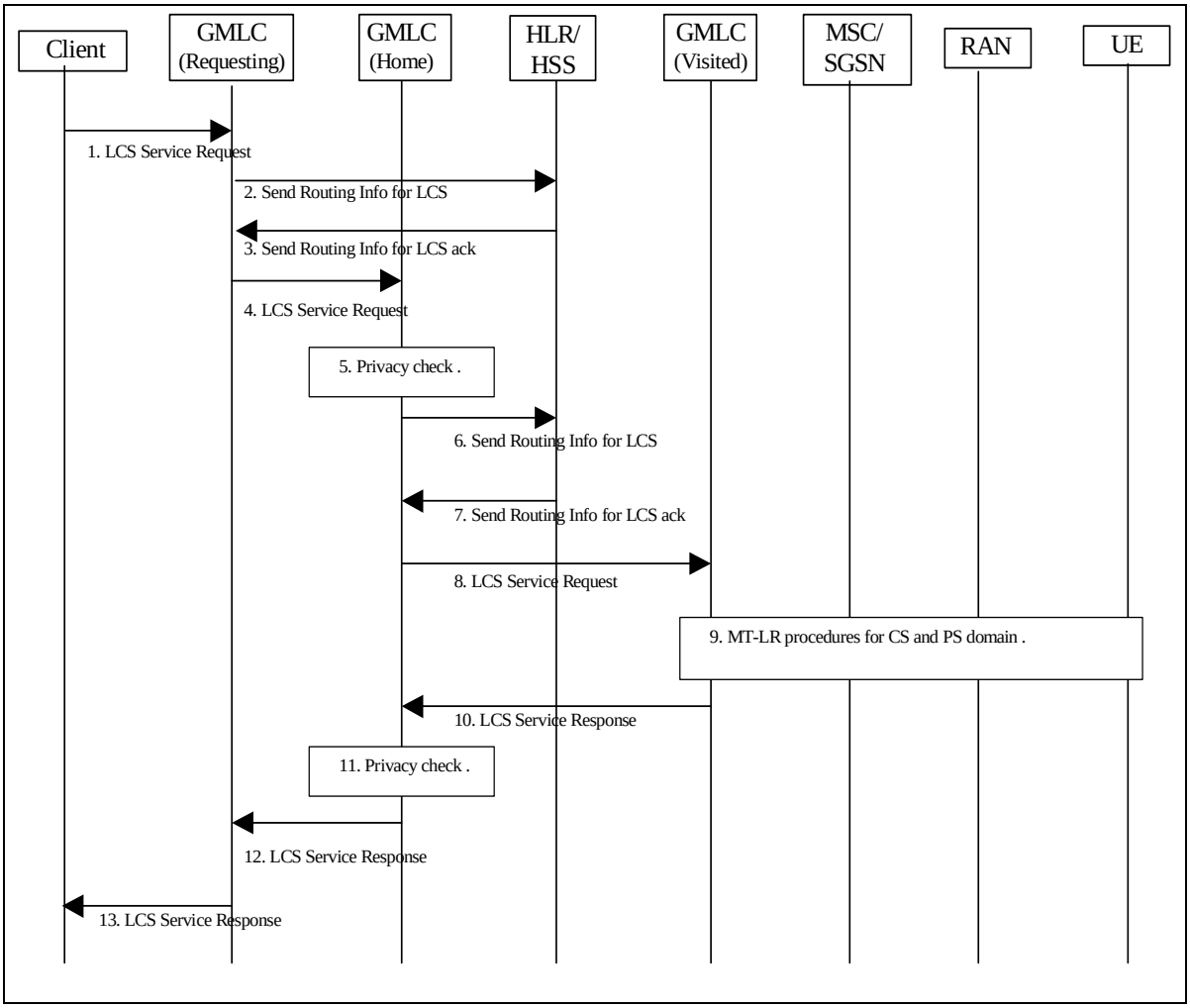


Figure 9.1: General Network Positioning for a MT-LR

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. 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), the H-GMLC 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 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 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 does not know 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 H-GMLC shall send 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. 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 changed clause >>

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.

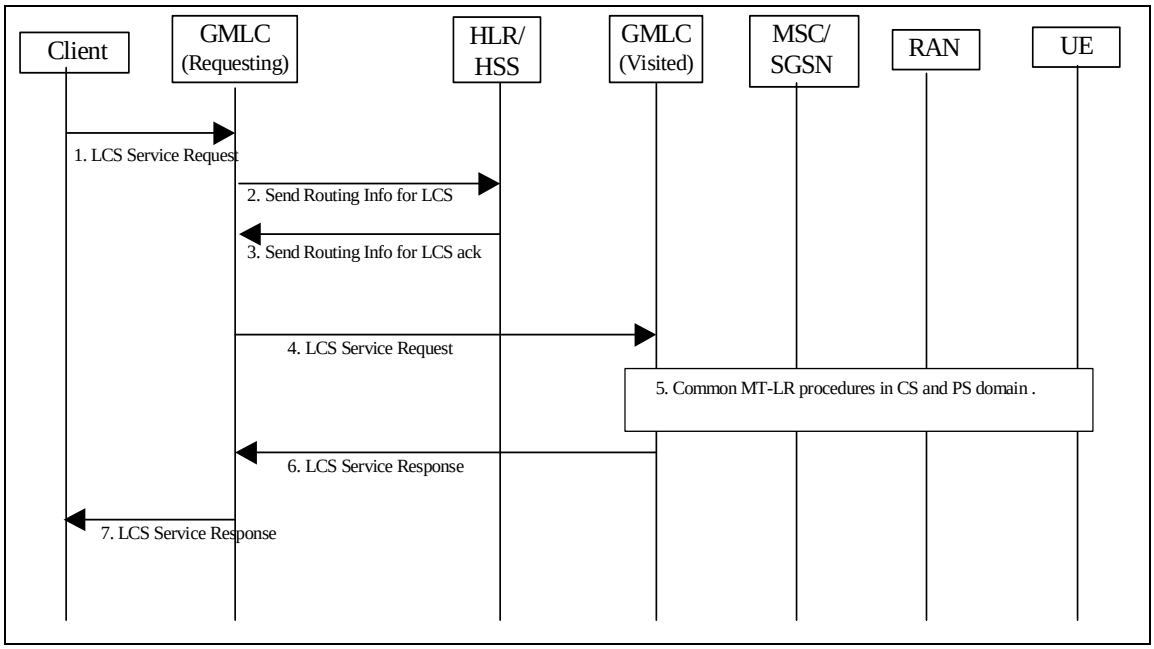


Figure 9.1A: Network Positioning for an Emergency MT-LR

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 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.

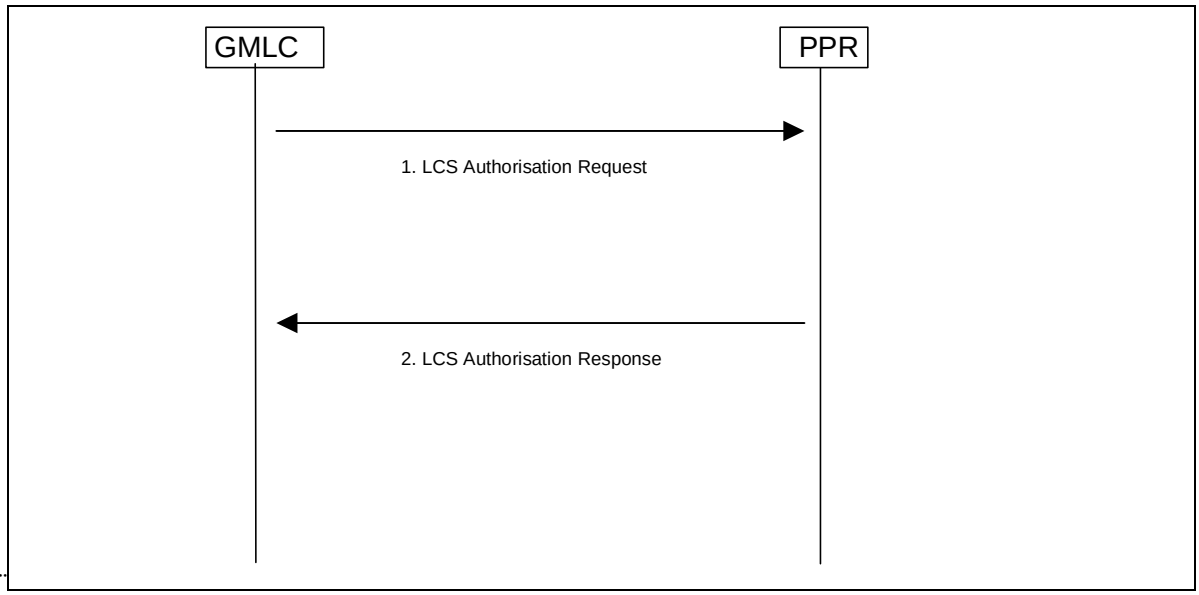


Figure 9.1B: LCS authorisation in PPR

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 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.

<< Next changed clause >>

9.1.1.2 LCS Privacy Profile Update

If the UE subscribers privacy information has been changed in the PPR the LCS Privacy Profile Update shall be send to the GMLC (H-GMLC), see figure 9.1C.

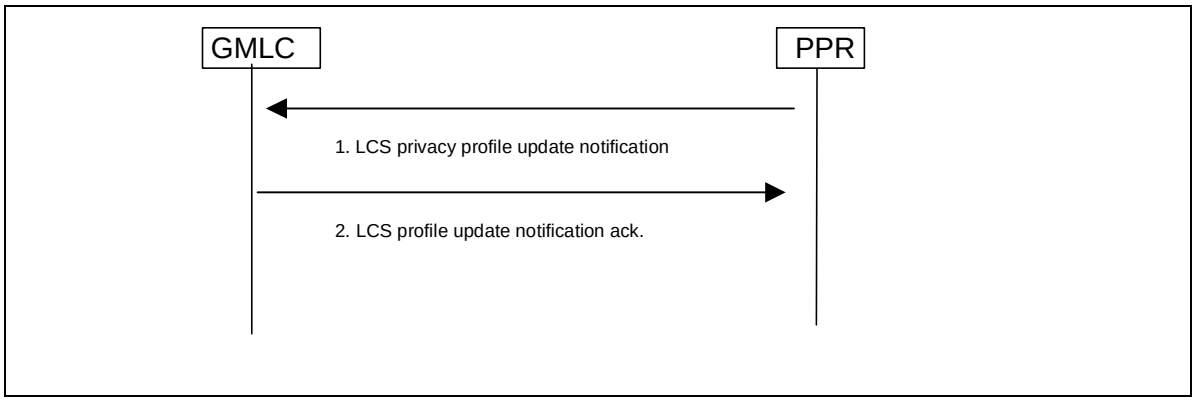


Figure 9.1C: PPR notification to GMLC about LCS privacy profile change

1) In case subscriber changed his privacy profile information in the PPR the LCS Privacy Profile Update shall be send to the GMLC (H-GMLC). The message shall carry the idenity of the UE subscriber.

2) GMLC acknowledges that it received the notification

<< Next changed clause >>

9.1.1.3 LCS identity request

The GMLC may request the verinym of the UE from the PMD, see figure 9.1D.

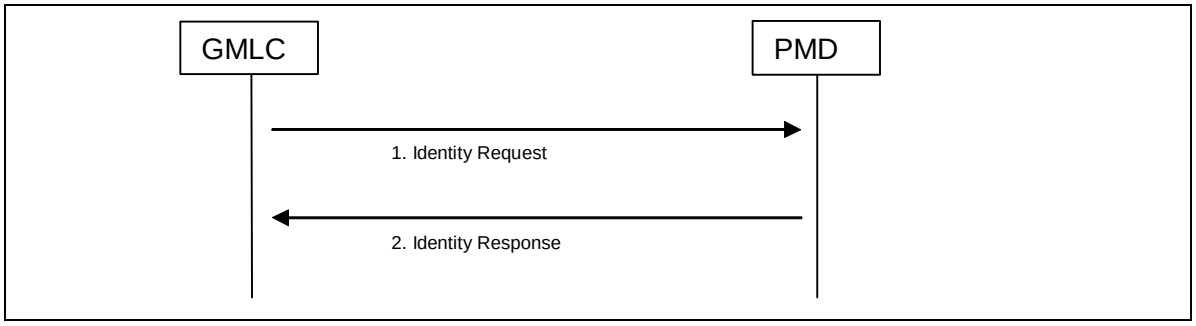


Figure 9.1DC: LCS identity request

1) The GMLC sends the pseudonym to its associated PMD and requests the corresponding verinym of the target UE –from PMD.

2) The PMD shall map or decrypt (e.g. using the private key of the operator) the target UE's pseudonym to the corresponding verinym, i.e. IMSI and /or MSISDN, to be included in the Identity Response.

<< Next changed clause >>

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 2). 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 2: 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 3~~2~~:It is for further study, 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.

<< Next changed clause >>

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 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, 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].~~

<< Next changed clause >>

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.

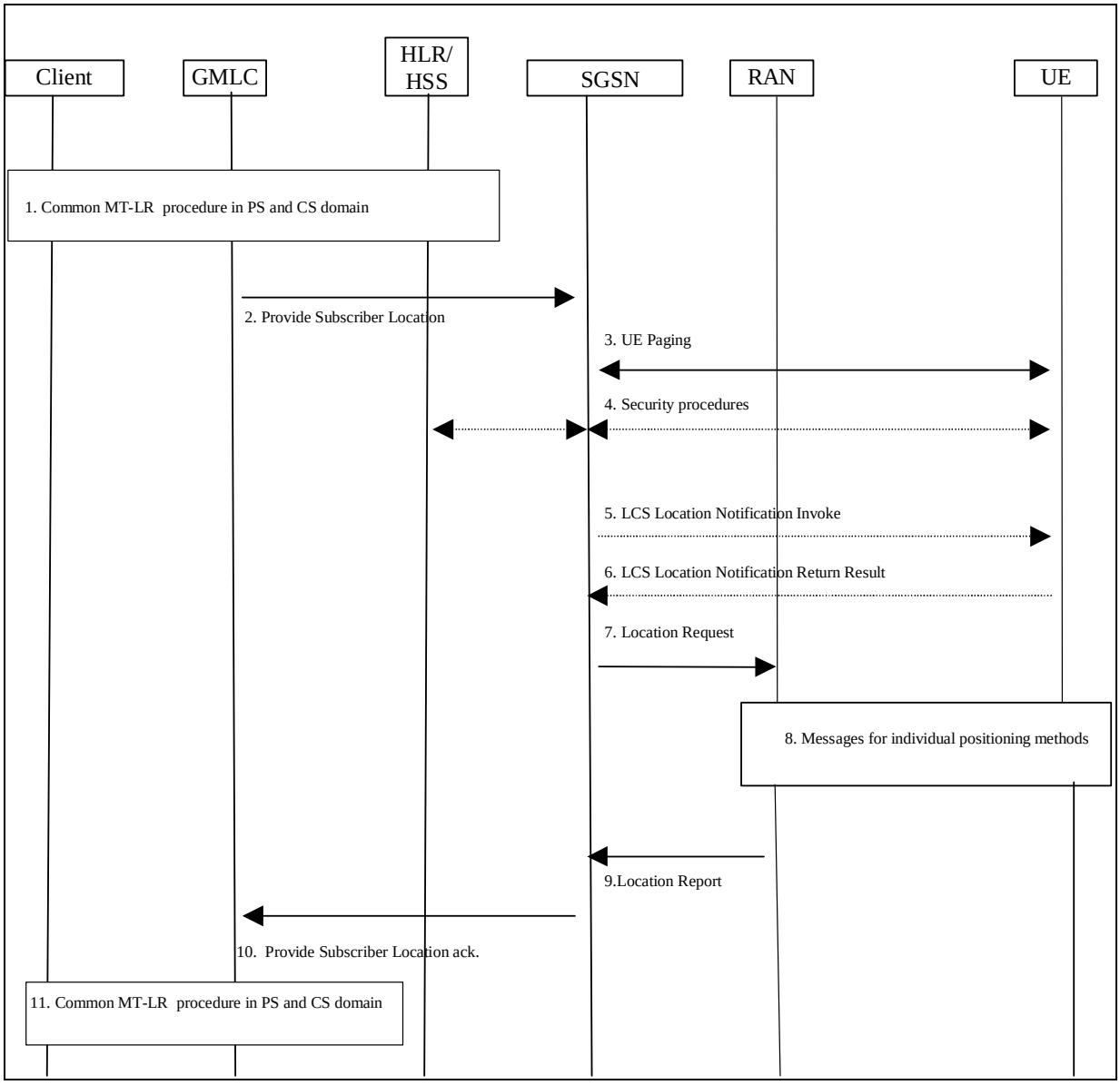


Figure 9.5: General Network Positioning for Packet Switched MT-LR

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.

<< Next changed clause >>

9.1.7.2 Location Calculation and Release Procedure

3) When a location estimate best satisfying the requested QoS has been obtained~~-~~, the RAN returns a Location Report to the SGSN. This message carries the location estimate that was obtained. If a location estimate was not succesfully obtained~~-~~, a failure cause is included in the Location Report.

4) The SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 1 carrying the MSISDN or PDP address of the UE, the identity of the LCS client, the event causing the location estimate (NI-LR-PS) and the location estimate and its age.

5) The GMLC shall acknowledge receipt of the location estimate provided that it serves the identified LCS client and the client is accessible.

6) The GMLC may transfer the location information to the LCS client either immediately or upon request from the client.

<< Next changed clause >>

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 actions ~~–~~fail~~s~~, 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 description below~~current specification,~~ it is assumed that the LCS client issues the Periodical/Deferred MT-LR with only the location estimate type of “current location”.

<< Next changed clause >>

10.3.2 LCS Data in the GMLC/PPR for a UE Subscriber

The GMLC (H-GMLC) or PPR may store LCS UE subscription data. This chapter describes Rel-5 based privacy profile data stored in GMLC/PPR. If the home network operator uses Rel-5 compatible privacy profile data, the profiles shown in this chapter may be stored in GMLC/PPR.

The IMSI or MSISDN is the primary key for LCS UE subscription data in the GMLC/PPR. 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 10.9: 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 GMLC/PPR shall store the logical state of the class on a per-subscriber (or per subscriber MSP) basis. In addition, the permanent data indicated in Table 10.10 may 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 10.10: LCS data stored in the GMLC/PPR privacy exception list for an UE Subscriber (or UE Subscriber MSP)

LCS Privacy Class	Status	Additional GMLC 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 C O C	External LCS client list: a list of zero or more LCS clients, with the following data stored for each LCS client in the list: • International E.164 address identifying a single LCS client or a single group of LCS clients that are permitted to locate this target UE • Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country • 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 C O C	External LCS client list: a list of zero or more LCS clients, with the following data stored for each LCS client in the list: • International E.164 address identifying a single LCS client or a single group of LCS clients that are permitted to locate this target UE • Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country • 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 10.11: LCS Service types stored in the GMLC per UE subscriber

Service type indication	Status	Additional HLR data when the indication is stored
Service Types	O	Indication of one of the following mutually exclusive options for any service type not in the service type 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 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. • Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country •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, the GMLC/PPR shall store the same pseudo-external identity table with HLR, which is shown in Annex C.

GMLC (H-GMLC) or PPR may store ~~a~~ codeword handling information and a list of codewords given by the UE subscriber in order not to get the location request rejected.

<< Next changed clause >>

10.5 Interworking between network nodes in different releases

This clause describes possible scenarios for interworking between network nodes in different releases. It is noted that LCS is only supported in A-mode and Iu-mode in the CS domain in Rel-99. LCS is supported in A-mode and Iu-mode in UTRAN CS and PS domains, but not in Gb-mode, in Rel-4. LCS is supported in A/Gb mode and Iu mode in CS and PS domains for UTRAN and GERAN from Rel-5 onwards.

The concept of LCS capability set is introduced in Rel-4, so it does not appear in the specifications for R98 and R99 LCS.

~~Note : this interworking scenario can be also applied for PS domain. Generalization of the description in this sub clause to cover both CS and PS domain should be done.~~

10.5.1 LCS capability set

The following LCS capabilities are identified in the current version of this specification. The HLR/HSS is notified the LCS capability of the serving node by an indication, which indicates all the LCS the serving node supports, from the serving node during location update procedure.

- LCS capability set 1: R98 and R99 LCS (pre-Rel'4 LCS)

- LCS capability set 2: Rel'4 LCS
- LCS capability set 3: Rel'5 LCS
- LCS capability set 4: Rel'6 or later LCS

Note: the concept of LCS capability set is introduced in Rel4 so that R98 and R99 serving nodes do not notify HLR/HSS this parameter. Therefore, even if this parameter is absent the serving node may support at most LCS capability set 1.

The serving node, which notified the HLR/HSS that it supports LCS capability set 2, shall be able to handle the extended LCS Client list and LCS Client List for call-related class from the HLR/HSS.

The serving node, which notified the HLR/HSS that it supports LCS capability set 3, shall support the following capabilities:

- capability to perform the service type privacy check.
- capability to send the codeword to target UE for notification/verification.
- capability to send the requestor ID to target UE for notification/verification.

The serving node, which notified the HLR/HSS that it supports LCS capability set 4, shall support the following capability:

- capability to perform the privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) which is requested by H-GMLC.

10.5.2 Interworking between pre Rel-4 serving node and Rel-4 or later HLR/HSS

The serving node that supports only pre-Rel'4 LCS cannot handle the extended privacy control for call-related/call-unrelated class of the Rel'4 and later LCS. That is, the serving node cannot provide the extended call-related/call-unrelated class service to the user who subscribes to the Rel'4 LCS. Therefore HLR does not send the LCS subscriber data on call-related/call-unrelated class for users who subscribe to the call-related class of Rel'4 LCS to the serving node that supports only pre-Rel'4 LCS.

10.5.3 Interworking between pre Rel-5 serving node and Rel-5 or later HLR/HSS

If the HLR/HSS is notified that the LCS capability set 3 is not supported by the serving node, itmay decide not to send the LCS subscriber data to the serving node, in order to protect user privacy.

In addition, if the HLR/HSS is notified that the serving node does not support the LCS capability set 2, the procedures described in 10.5.2 also shall be applied.

10.5.4 Interworking between pre Rel-6 network nodes and Rel-6 or later HLR/HSS

In addition to the procedures in this section, if the HLR/HSS is notified that the serving node does not support the LCS capability set 2 and/or set 3, the procedures described in 10.5.3 shall be also taken into consideration.

10.5.4.1 Rel-6 or later HLR/HSS with pre Rel-6 serving node

The Rel-6 or later HLR/HSS notifies the H-GMLC about the all LCS capability set supported by the serving node.

In accordance with the notified LCS capability of the serving node and the privacy profile of the target UE, the H-GMLC decides whether the location estimation process can be continued or not.

In order to request the privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) to the pre Rel-6 serving node, H-GMLC may send the Provide Subscriber Location request message to the serving node with the pseudo-external identity. The detail of the pseudo-external identity is described in Annex C.

3GPP TSG-SA WG 2 Meeting #34
Brussels, Belgium, 18 - 22 August 2003

Tdoc ⌘S2-033050

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **209** ⌘ **rev** **-** ⌘ Current version: **6.4.0** ⌘

*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:	⌘	LCS capabilities and LCS client type
Source:	⌘	Siemens
Work item code:	⌘	LCS2
Date:	⌘	12/08/2003
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:	⌘	The term “LCS core network signalling capabilities of the serving nodes” in clause 9.1.1, step 3 is not clear. The LCS client type is conveyed for authorisation between GMLC and PPR, but not listed as a parameter in 9.1.1.1, step 1.
Summary of change:	⌘	The term “LCS core network signalling capabilities of the serving nodes” has been modified to “LCS capability of the serving nodes”. The LCS client type has been listed as a parameter.
Consequences if not approved:	⌘	The term “LCS core network signalling capabilities of the serving nodes” and the usage of LCS client type for LCS authorisation remains unclear

Clauses affected:	⌘	9.1.1, 9.1.1.1

		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:
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.

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

9.1.1 Common MT-LR procedure in PS and CS domain

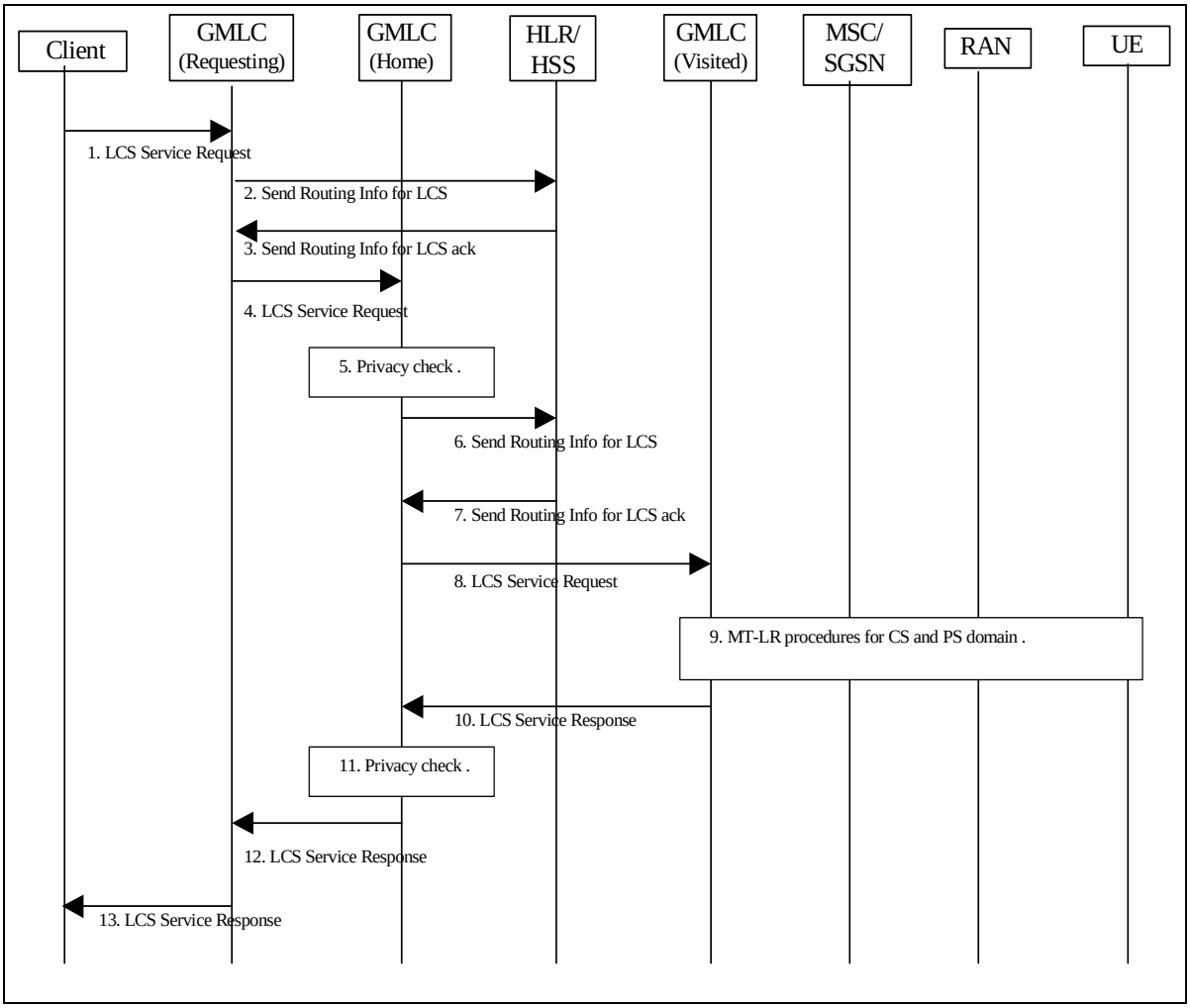


Figure 9.1: General Network Positioning for a MT-LR

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 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. 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), the H-GMLC 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 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 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 does not know 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 H-GMLC shall send 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. 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 Modified Section **********

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.

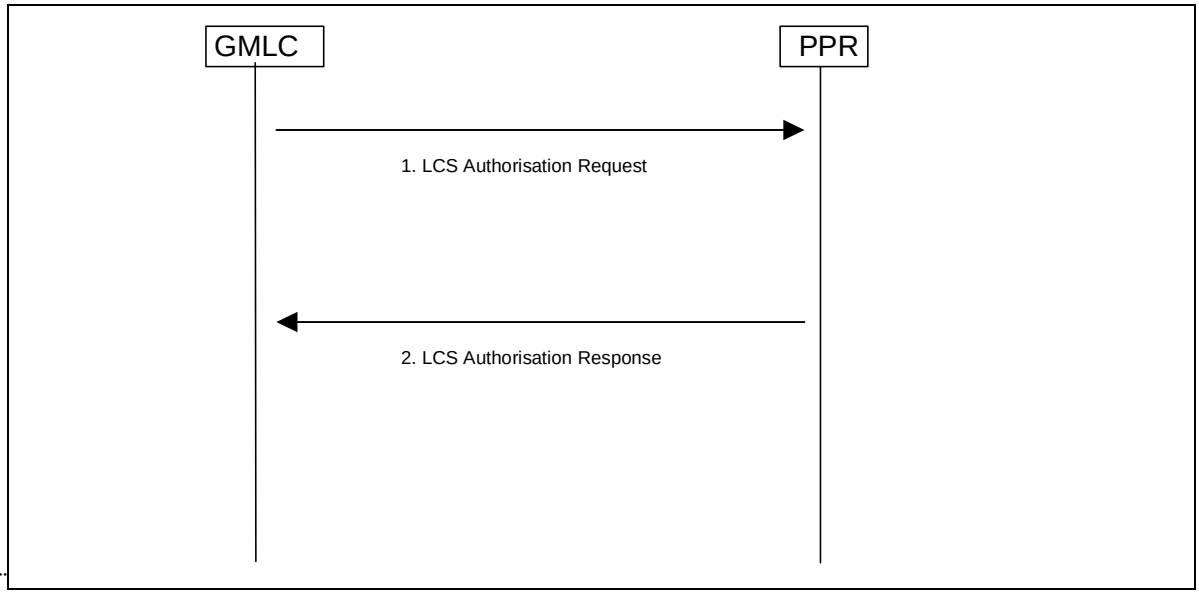


Figure 9.1B: LCS authorisation in PPR

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 LCS client type, the UE subscriber's identity 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.

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 211 ⌘rev - ⌘ Current version: 5.7.0 ⌘

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

Title: ⌘	Correcting reference to LIF-MLP specification	
Source: ⌘	Nokia	
Work item code: ⌘	LCS2	**Date:** ⌘ 12.8.2003
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: ⌘	The reference to LIF TS 101 "Mobile Location Protocol Specification" should be corrected, so that the reader is able to find the specification in question.
Summary of change: ⌘	Reference [31] is corrected in the reference list in clause 2.1.
Consequences if not approved: ⌘	The reference list would not be correct and misleading.

Clauses affected: ⌘	2.1			
Other specs Affected: ⌘	**Y**	**N**		
		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	
Other comments: ⌘	The double brackets around the reference numbers should be removed in clause 2.1.			

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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 >>

2.1 Normative references

3G TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".

[2] GSM 01.04 (ETR 350): "Abbreviations and acronyms".

[3] 3G TS 21.905: "UMTS Abbreviations and acronyms".

[4] 3G TS 22.071: "Technical Specification Group Systems Aspects; Location Services (LCS); Stage 1".

[5] (void)

[6] 3G TS 48.008: "Mobile-services Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

[7] 3G TS 22.100: "UMTS phase 1 (Release 1999)".

[8] 3G TS 22.101: "Service principles".

[9] 3G TS 22.105: "Services and Service Capabilities".

[10] 3G TS 22.115: "Charging and Billing".

[11] 3G TS 23.032 (GSM 03.32): "Universal Geographical Area Description (GAD)".

[12] 3G TS 22.121: "The Virtual Home Environment".

[13] 3G TS 23.110: "UMTS Access Stratum Services and Functions".

[14] 3G TS 25.413: "UTRAN Iu Interface RANAP signaling".

[15] 3G TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[16] 3G TS 43.059: "Functional Stage 2 description of Location Services in GERAN".

[17] 3G TS 23.003: "Numbering, addressing and identification".

[18] 3G TS 29.002: "Mobile Application Part (MAP) Specification".

[19] GSM 04.02: "GSM Public Land Mobile Network (PLMN) access reference configuration".

[20] 3G TS 23.002: "Network architecture".

[21] 3G TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) - stage 2".

[22] 3G TS 23.011: "Technical realization of Supplementary Services".

[23] 3G TS 23.007: "Restoration procedures".

[24] 3G TS 24.008: "Mobile Radio Interface - Layer 3 MM/CC Specification".

[25] 3G TS 25.331 "RRC protocol specification".

[26] 3G TS 23.127 "Virtual Home Environment/Open Service Access".

[27] 3G TS 29.198-1: “Open Service Access (OSA); Application Programming Interface (API); Part 1; Overview”.

[28] 3G TS 29.198-2: “Open Service Access (OSA); Application Programming Interface (API); Part 2; Common Data”.

[29] 3G TS 29.198-3: “Open Service Access (OSA); Application Programming Interface (API); Part 3; Framework”.

[30] 3G TS 29.198-6: "Open Service Access (OSA); Application Programming Interface (API); Part 6: Mobility".

[31] LIF TS 101 "Mobile Location Protocol Specification" (Location Interoperability Forum ~~2001~~) [Available at ~~http://www.locationforum.org/public_document_area.htm~~ http://www.openmobilealliance.org/tech/LIF/]

[32] ANSI J-STD-036A: “Enhanced Wireless 9-1-1 Phase 2”

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 212 ⌘rev - ⌘ Current version: 6.4.0 ⌘

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

Title: ⌘	Correcting reference to LIF-MLP specification	
Source: ⌘	Nokia	
Work item code: ⌘	LCS2	**Date:** ⌘ 12.8.2003
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)*
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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: ⌘	The reference to LIF TS 101 "Mobile Location Protocol Specification" should be corrected, so that the reader is able to find the specification in question.
Summary of change: ⌘	Reference [31] is corrected in the reference list in clause 2.1.
Consequences if not approved: ⌘	The reference list would not be correct and misleading.

Clauses affected: ⌘	2.1			
Other specs Affected: ⌘	**Y**	**N**		
		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	
Other comments: ⌘	The double brackets around the reference numbers should be removed in clause 2.1.			

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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 >>

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[2] GSM 01.04 (ETR 350): "Abbreviations and acronyms".

[3] 3G TS 21.905: "UMTS Abbreviations and acronyms".

[4] 3G TS 22.071: "Technical Specification Group Systems Aspects; Location Services (LCS); Stage 1".

[5] (void)

[6] 3G TS 48.008: "Mobile-services Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

[7] 3G TS 22.100: "UMTS phase 1 (Release 1999)".

[8] 3G TS 22.101: "Service principles".

[9] 3G TS 22.105: "Services and Service Capabilities".

[10] 3G TS 22.115: "Charging and Billing".

[11] 3G TS 23.032 (GSM 03.32): "Universal Geographical Area Description (GAD)".

[12] 3G TS 22.121: "The Virtual Home Environment".

[13] 3G TS 23.110: "UMTS Access Stratum Services and Functions".

[14] 3G TS 25.413: "UTRAN Iu Interface RANAP signaling".

[15] 3G TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

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[17] 3G TS 23.003: "Numbering, addressing and identification".

[18] 3G TS 29.002: "Mobile Application Part (MAP) Specification".

[19] GSM 04.02: "GSM Public Land Mobile Network (PLMN) access reference configuration".

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[23] 3G TS 23.007: "Restoration procedures".

[24] 3G TS 24.008: "Mobile Radio Interface - Layer 3 MM/CC Specification".

[25] 3G TS 25.331 "RRC protocol specification".

[26] 3G TS 23.127 "Virtual Home Environment/Open Service Access".

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[29] 3G TS 29.198-3: “Open Service Access (OSA); Application Programming Interface (API); Part 3; Framework”.

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[31] LIF TS 101 "Mobile Location Protocol Specification" (Location Interoperability Forum ~~2001~~) [Available at ~~http://www.locationforum.org/public_document_area.htm~~http://www.openmobilealliance.org/tech/LIF/]

[32] ANSI J-STD-036A: “Enhanced Wireless 9-1-1 Phase 2”

[33] RFC 2396: “Uniform Resource Identifiers”.

[34] RFC2543: “SIP: Session Initiation Protocol”.

[35] 3G TS 23.228: "IP multimedia subsystem (IMS)"

Tdoc ⌘ S2-033118
(Revised S2-033027)

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 206 ⌘rev 1 ⌘ Current version: 4.9.0 ⌘

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

Title:	⌘	Removing PDP addressing of the target UE
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	19.8.2003
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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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:	⌘	According to the specification the GMLC can identify the target UE using the PDP address of the target UE in the location request it sends to SGSN. This is not possible in practise and the specification is in contradiction with stage 3.
Summary of change:	⌘	PDP address as an identity of the target UE is deleted. The corresponding note that the issue is FFS is deleted.
Consequences if not approved:	⌘	The stage 2 description in 23.271 would be wrong and in contradiction with the corresponding stage 3 specifications.

Clauses affected:	⌘	9.1.1 9.1.6 9.1.7.2			
		Y	**N**		
Other specs Affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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<< First changed clause >>

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

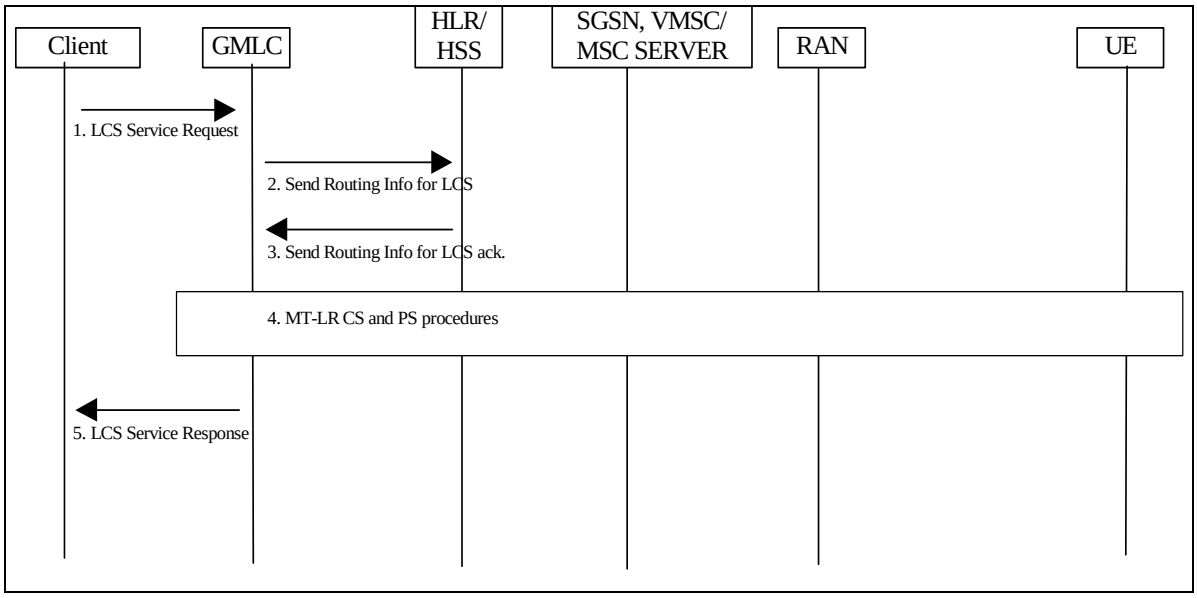

Figure 9.1: General Network Positioning for a MT-LR

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. 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 (Note: only applicable to 3G-SGSN in Rel-4) 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 of the target UE to be located with the IMSI or MSISDN of this UE.

3) The HLR 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 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 may prioritize between the MSC/VLR or SGSN address sent to GMLC. The 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 HLRor 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 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.

<< Next changed clause >>

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.

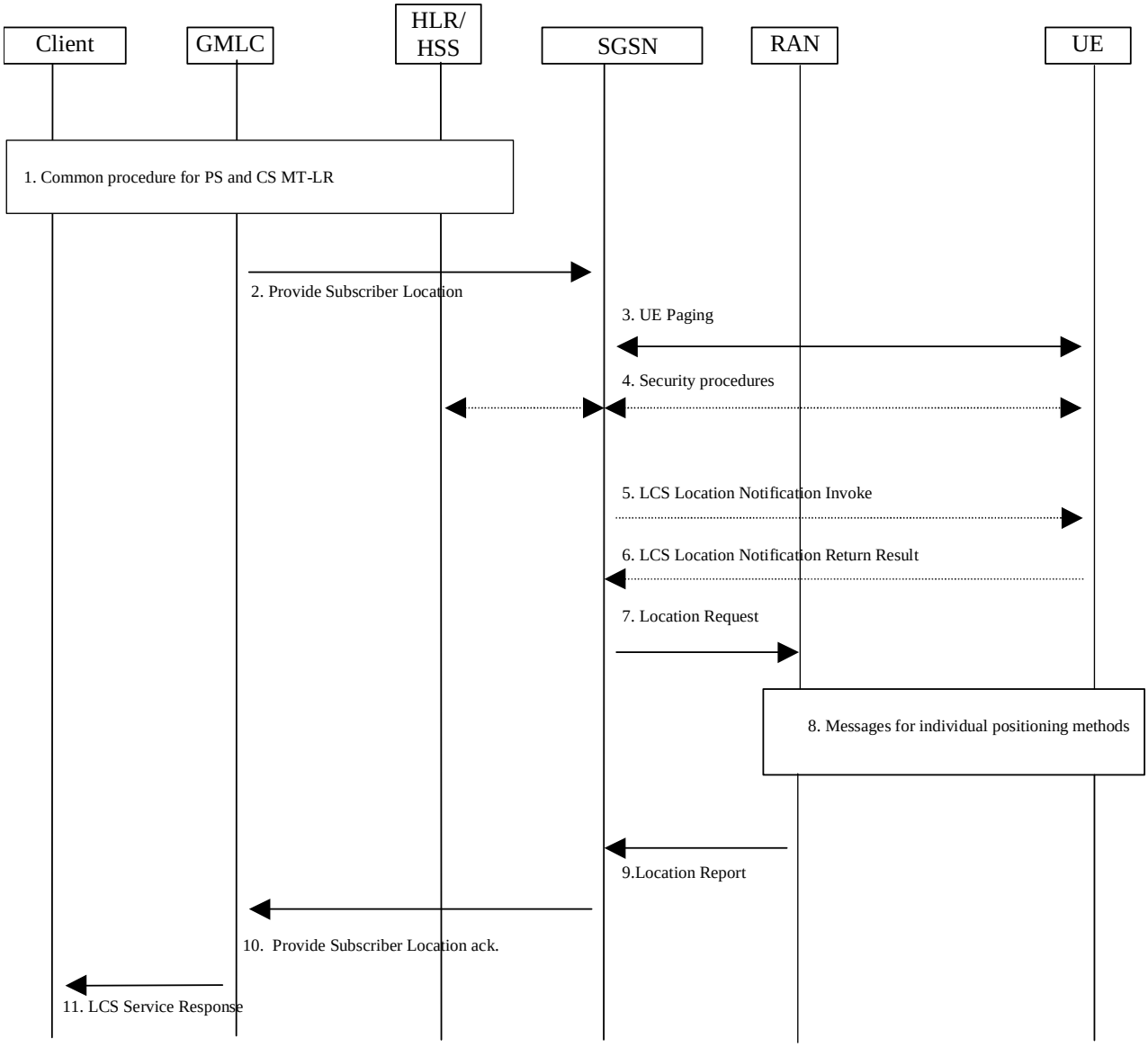

Figure 9.5: General Network Positioning for Packet Switched MT-LR

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. 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 and the external identity of the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client.

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. 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 whether privacy verification is required. 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.

<< Next changed clause >>

9.1.7.2 Location Calculation and Release Procedure

3) When a location estimate best satisfying the requested QoS has been obtained , the RAN returns a Location Report to the SGSN. This message carries the location estimate that was obtained. If a location estimate was not succesfully obtained , a failure cause is included in the Location Report.

4) The SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 1 carrying the MSISDN ~~or PDP address~~ of the UE, the identity of the LCS client, the event causing the location estimate (NI-LR-PS) and the location estimate and its age.

5) The GMLC shall acknowledge receipt of the location estimate provided that it serves the identified LCS client and the client is accessible.

6) The GMLC may transfer the location information to the LCS client either immediately or upon request from the client.

3GPP TSG-SA2 Meeting #34
Brussels, Belgium, 18-22 August 2003

Tdoc ⌘S2-033126
Revised S2-032976

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **200** ⌘**rev** **1** ⌘ Current version: **6.4.0** ⌘

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

Title:	⌘	Addition of Missing Indicator of Privacy Action as a Result of a Privacy Check
Source:	⌘	Vodafone UK, NEC
Work item code:	⌘	LCS2
Date:	⌘	30/07/2003
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:	⌘	There are already well defined actions to be taken as a result of a privacy. With the introduction of the PPR, the privacy check is performed by the PPR, but it is the job of the H-GMLC and serving node (SGSN or MSC) to enforce the action as a result of the privacy check. One of the defined actions is "Positioning Not Allowed". This means that the location request should not be allowed to progress possibly if certain conditions aren't met (i.e. call/session related status). Currently there is no means to inform the H-GMLC of the action "Positioning Not Allowed"
Summary of change:	⌘	Addition of the indication "Positioning Not Allowed" to the list of values of Indication of Privacy Action within the LCS Authorisation Response message on the Lpp interface.
Consequences if not approved:	⌘	It will not be possible to bar location requests based on the information supplied as required by the privacy settings determined by a user.

Clauses affected:	⌘	7.4.2, 9.1.1.1

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

Other comments:	⌘	This CR will affect OMA Lpp interface protocol work.

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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.

7.4.2 LCS Authorisation Response

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

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

- Indicator for location request is to be barred, if needed. If this is set, no other indicators shall be included in the response;
- Indicator for call/session related class of privacy check related actions, if needed;
  - positioning not allowed;
  - 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 unrelated class of privacy check related actions, if needed;
  - positioning not allowed;
  - 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.

<< Skip to Next Change >>

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.

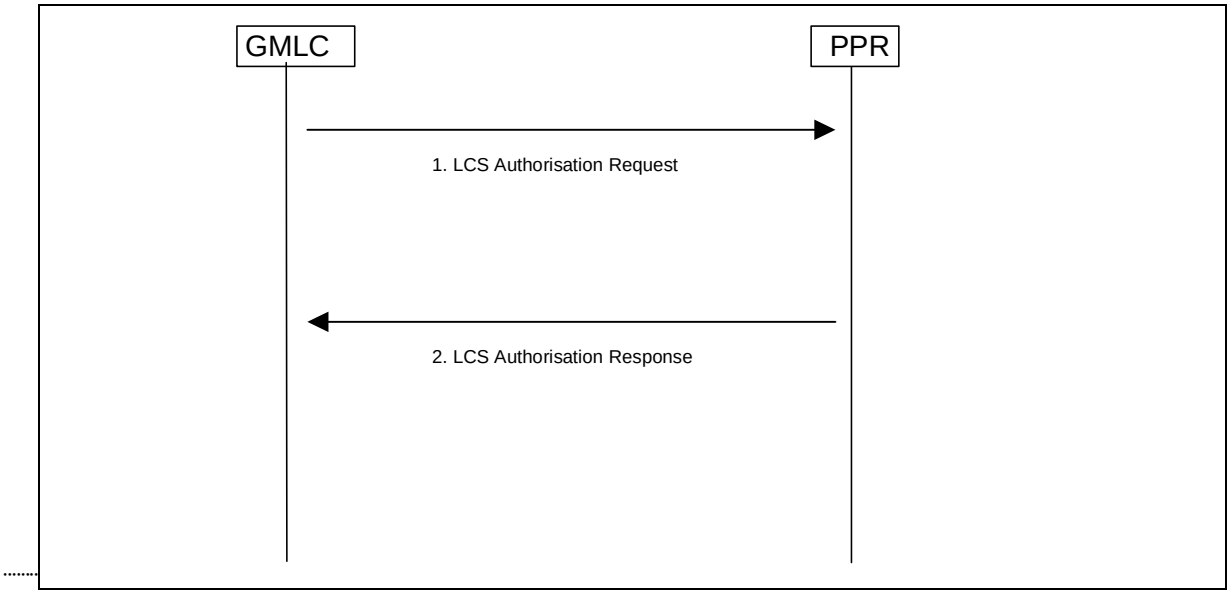

Figure 9.1B: LCS authorisation in PPR

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 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 the location request is to be barred, the PPR shall send an indication of this within the LCS Authorisation response and no other indicators. 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 #34
Brussels, Belgium, 18th – 22nd August 2003

Tdoc ⌘S2-033251
(revised from S2-032839)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **210** ⌘ **rev** **3** ⌘ Current version: **6.4.0** ⌘

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

Title:	⌘	Clarification on the privacy check procedure in Rel-6.
Source:	⌘	NEC
Work item code:	⌘	LCS2
Date:	⌘	20/08/2003
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 Rel-6, the privacy check function is moved from MSC/SGSN to H-GMLC/PPR. According with the functional modification, the privacy related action indicator and the pseudo external identity concept is introduced in order to notify MSC/SGSN about the result of the privacy check in H-GMLC/PPR. However, in the current specification, the description about the privacy check procedures are not sufficient.
Summary of change:	⌘	The privacy check procedures and the usage of the privacy related action indicator and the pseudo external identity are clarified.
Consequences if not approved:	⌘	The description about the privacy check procedures remains unclear and this may cause misunderstanding of the specification and may cause wrong handling of the UE's privacy.

Clauses affected:	⌘	9.1.1, 9.1.2.1, 9.1.6.1, 9.5.2, 9.5.3.1, 9.5.4, Annex A, Annex C

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

Other comments:	⌘	This CR has overlapping clauses with the CRs included in S2-033029, S2-033039, S2-033050. However there is no conflict between this CR and these CRs. There is some conflict between this CR and the CR included in S2-032651. The changes in S2-032651 are merged into this CR and some of the changes are modified.

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 Modification >>

9.1.1 Common MT-LR procedure in PS and CS domain

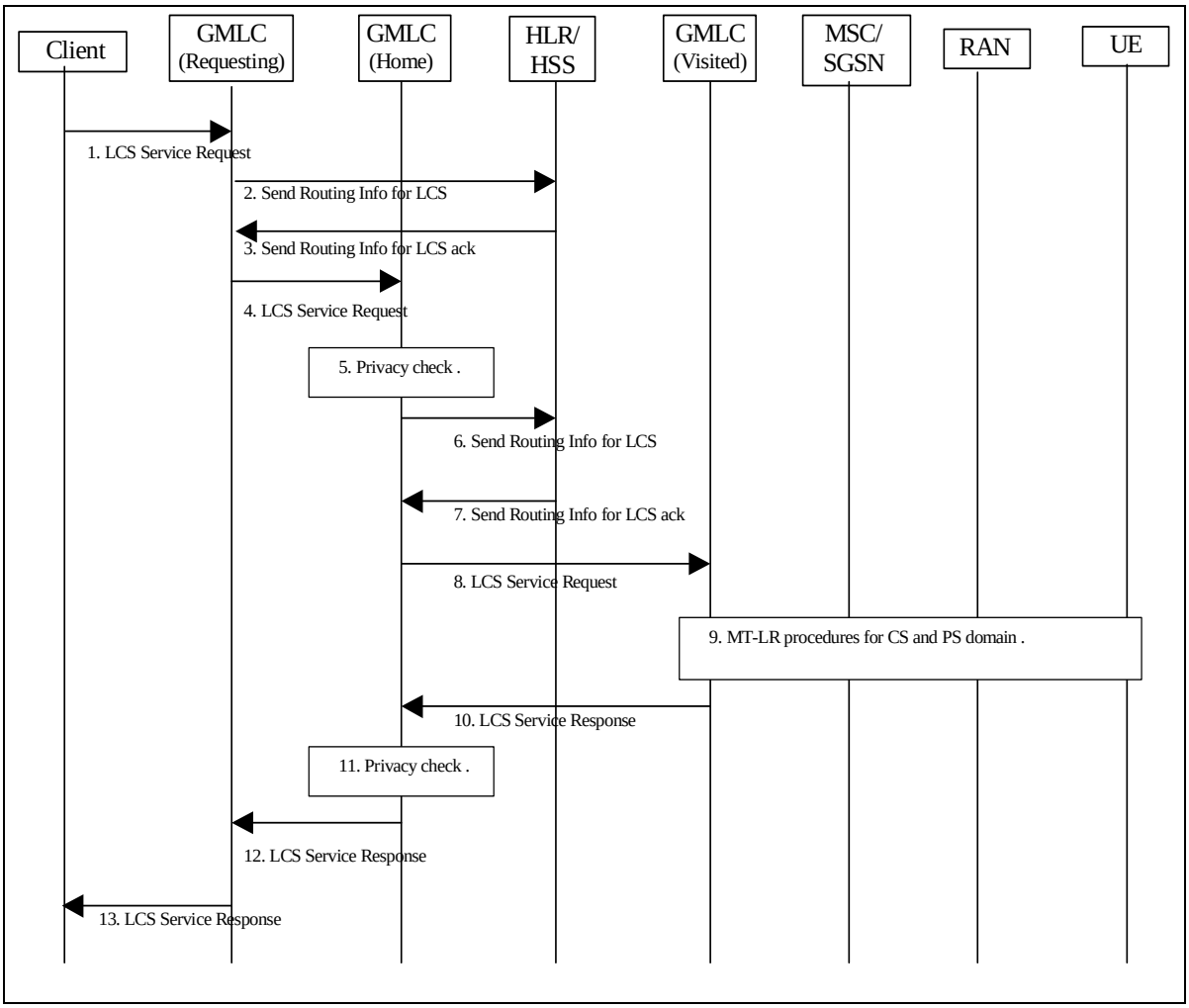

Figure 9.1: General Network Positioning for a MT-LR

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. 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), the H-GMLC 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 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 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~~one or two indicators 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 does not know 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 H-GMLC shall send 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.~~i.e. by using the indicator of the privacy check related action as described in chapter 9.5.4 or 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 H-GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 in order to decide whether the H-GMLC can forward the location information to the LCS client. 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.

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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.

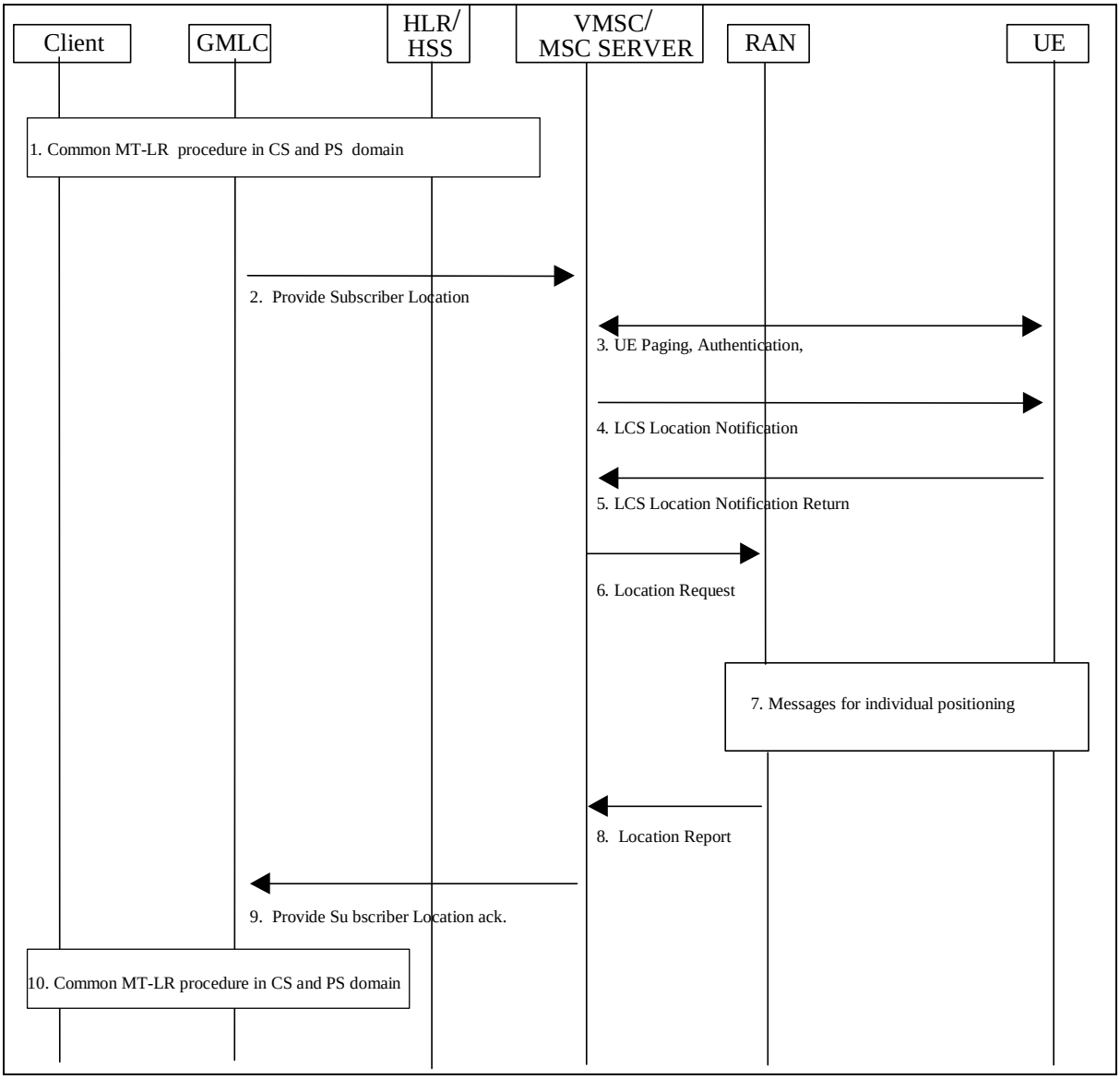

Figure 9.2: Network Positioning for a CS-MT-LR

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 (or the pseudo external identity) 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 indicatorsion of the requested privacy related action which is described in chapter 9.5.4 (i.e. checking the on-going call/session and/or notification/verification procedures) in the MSC, which, if it 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 contains the indicators of privacy related action, the VMSC/MSC server determines a required privacy related action as described in Annex A.3. If the PSL message from the GMLC does not include the indicatorsion 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: It is for further study, 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.

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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.

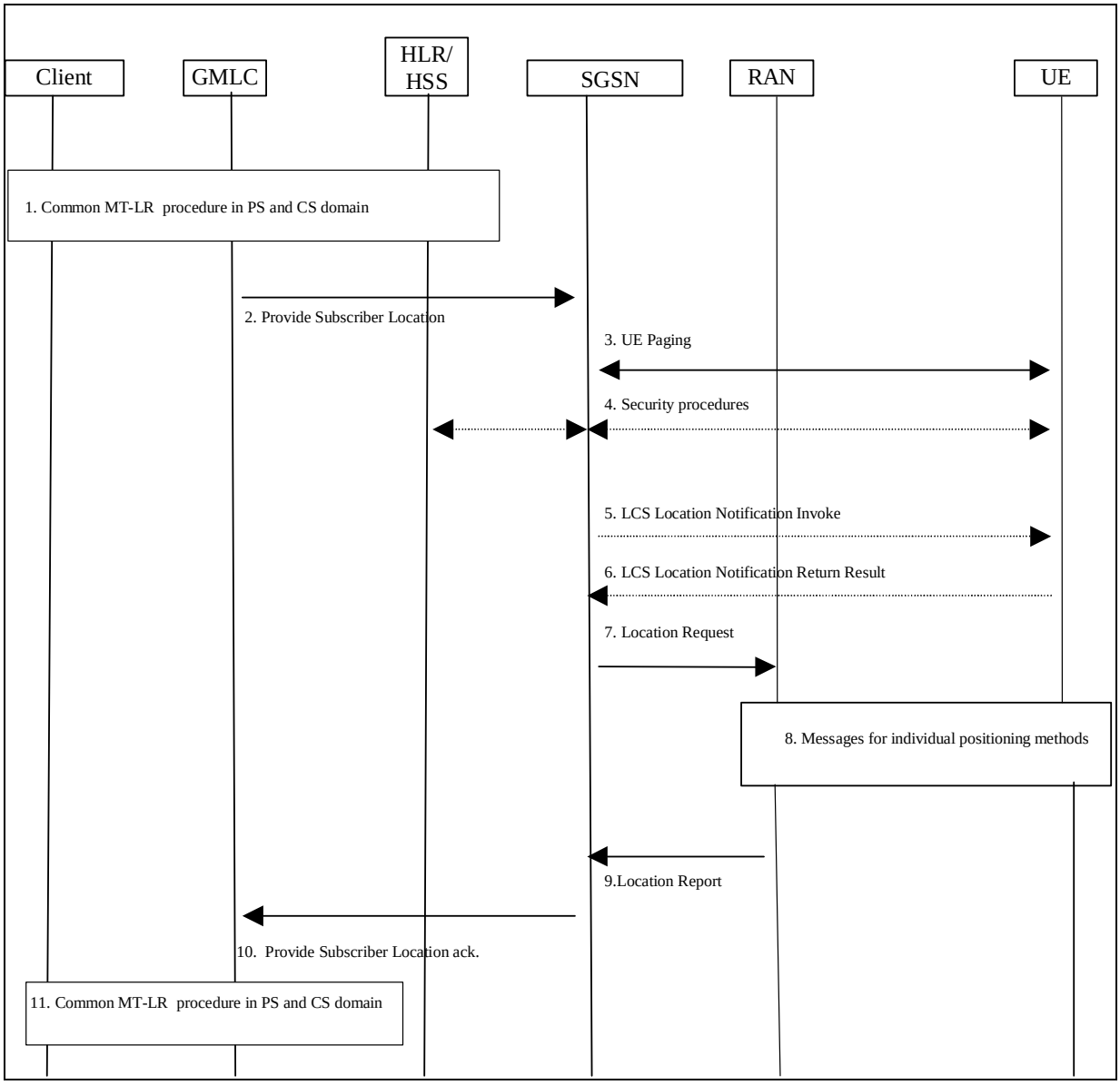

Figure 9.5: General Network Positioning for Packet Switched MT-LR

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 (or the pseudo external identity) 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 indicators~~ion~~ of ~~the requested~~ privacy related action which is

described in chapter 9.5.4 ~~(i.e. checking the on-going call/session and/or notification/verification procedures) in the SGSN~~, ~~which~~if it 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 includes the indicators of privacy related action, the SGSN determines a required privacy related action as described in Annex A.3. If the PSL message from the GMLC does not include the ~~indication~~ indicators 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 indicators 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, 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.

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9.5.2 Privacy Procedures

The privacy profile of the UE subscriber (SLPP) may be stored in HLR/HSS ~~(SLPP)~~ and/or in H-GMLC/PPR. If the privacy profile data are stored in SLPP of H-GMLC/PPR, then the pseudo external identities, if required, shall be contained in the SLPP of the HLR/HSS. Also if the privacy profile data are stored in H-GMLC/PPR, H-GMLC/PPR sends the indicators of privacy related action or the pseudo external identities to the serving nodes in order to inform the results of the privacy check procedures in H-GMLC/PPR.

The SLPP stored in the HLR/HSS shall be downloaded to the VMSC, MSC Server and SGSN together with the rest of his subscription information in the existing operation INSERT_SUBSCRIBER_DATA. It will be deleted with the existing operation DELETE_SUBSCRIBER_DATA.

The POI is transferred from the GMLC to the VMSC/MSC Server/SGSN in the location request. Based on the location of the GMLC the VMSC/MSC Server/SGSN evaluates whether to accept or ignore the received POI according to the definition in clause 9.5.1.

If the POI is accepted the location requested is unconditionally performed. Otherwise if the POI is ignored the VMSC/MSC Server/SGSN evaluates the privacy options in the UE subscriber's subscription profile (assuming this is

held in the VLR/MSC Server/SGSN) or evaluates the received privacy related action indicators. If the corresponding register does not contain the UE subscription profile, LCS will rely on the existing GSM recovery mechanisms to obtain the profile.

If local regulatory requirements mandate it, any MT-LR for an emergency services LCS client and any NI-LR for an emergency services call origination shall be allowed by the VMSC/MSC Server.

If the location request is allowed by the privacy options the location request is performed. Otherwise, if the location request is barred by the privacy options, the location request is refused an error response is returned to the ~~GMLC~~ LCS client with a cause code indicating that the request was rejected by the subscriber.

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9.5.3.1 Universal class

When the user of the UE subscribes to the "Universal Class" the CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR positioning is allowed by all LCS clients.

If the UE subscribes to the universal class, any CS-MT-LR or NI-LR shall be allowed by the VMSC/MSC Server and any PS-MT-LR or PS-NI-LR shall be allowed by the SGSN.

If the UE subscribes to the universal class and H-GMLC/PPR knows that the serving node supports the indicator of privacy check related action, H-GMLC/PPR sends the indicators for call/session unrelated class, which indicates "Location allowed without notification". If the UE subscribes to the universal class and H-GMLC/PPR knows that the serving node does not support the indicator of privacy check related action, H-GMLC/PPR may sends the appropriate pseudo external identity as described in Annex C.

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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~~chosen as shown in Annex A.3.

If the UE subscribes to the universal class, H-GMLC/PPR sends the indicator for call/session unrelated class with the value of "Location allowed without notification".

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Annex A (normative): Privacy Class selection rule in serving node

A.1 Interrelation among privacy settings

There are five privacy settings and the interrelation among each privacy setting in terms of privacy strictness is shown as follows:

Table A.1: Privacy settings

loose	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
strict	Positioning not allowed

A.2 Privacy class selection rule for pre Rel-6 mechanism

In pre Rel-6 network, the users privacy profile (SLPP) is stored HLR/HSS and is downloaded to the serving MSC/SGSN. If more than one privacy class are subscribed or in case Service Types and at least one privacy class are subscribed, privacy class for an MT-LR is selected by the serving MSC/SGSN according to the ~~following~~ flow diagram shown in Fig. A-1.

An MT-LR may be applied to more than one privacy class or to Service Types and one or more privacy classes. In this case, looser privacy setting shall be selected. ~~All possible privacy setting values are listed in the table below.~~ The privacy settings to be compared are the results of the privacy checks for each applicable class and Service Type. ~~The interrelation among each privacy setting in terms of privacy strictness is shown as follows:~~

~~loose 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~~
~~strict Positioning not allowed~~

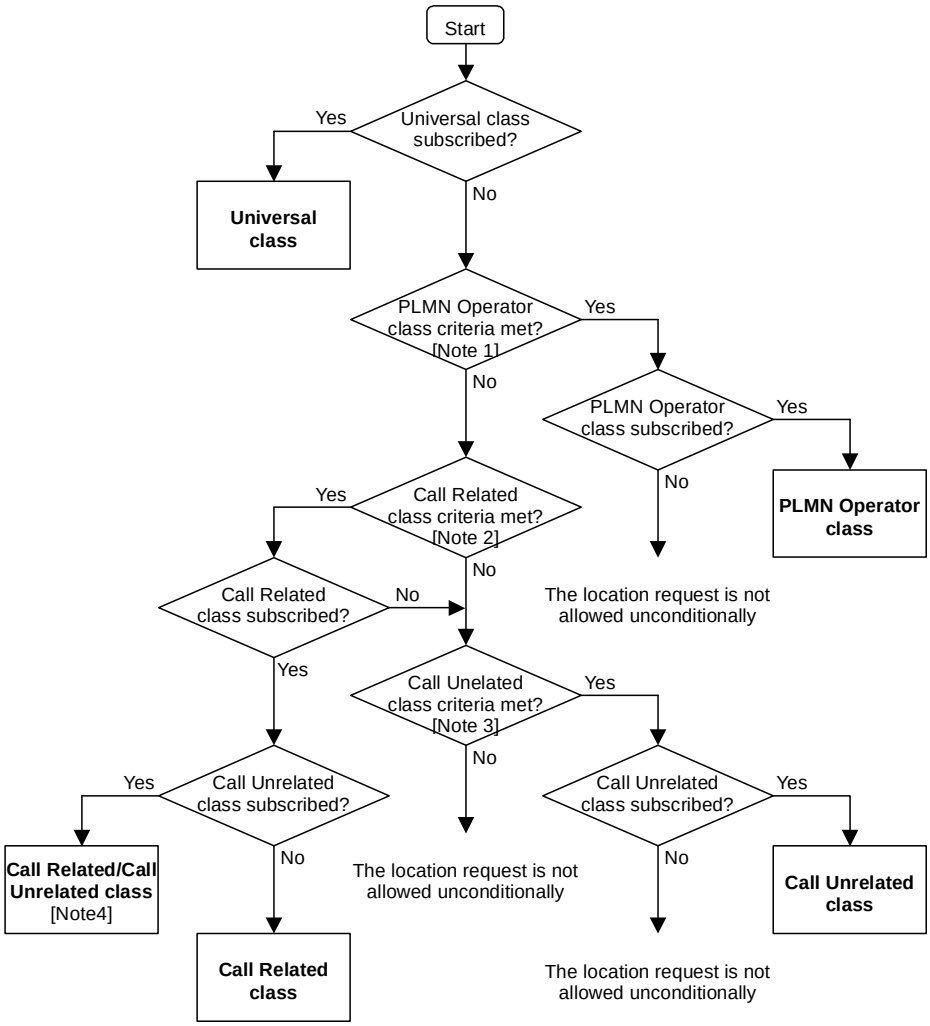

Figure A.1: Privacy Class selection flow diagram

Note 1: The client type indicates PLMN Operator service, and the client is within or associated with the VPLMN.
Note 2: The client type indicates value added service; the UE originated call/session to the requesting LCS client is established and the address associated to the LCS client used by the UE in call/session set up matches with that contained in the location request.
Note 3: The client type indicates value added service.
Note 4: The looser privacy setting shall be selected.

If the user subscribes Service Types, once that the privacy class has been selected according to figure A.1, the resulting privacy setting shall be compared with the result of Service Type privacy checking, and the looser condition shall be applied to the MT-LR, provided that the LCS client was authorized by the UE user to get location information.

A.3 Privacy related action selection rule for Rel-6 and later

In Rel-6 and later, the privacy checking function is moved from MSC/SGSN to H-GMLC/PPR of the target UE. H-GMLC/PPR selects one or two indicators of privacy check related action and sends the indicators to serving MSC/SGSN as shown in the clause 9.5.4. If the serving MSC/SGSN receives the indicators from H-GMLC, the serving node selects the privacy related action according to the flow diagram shown in Fig. A-2.

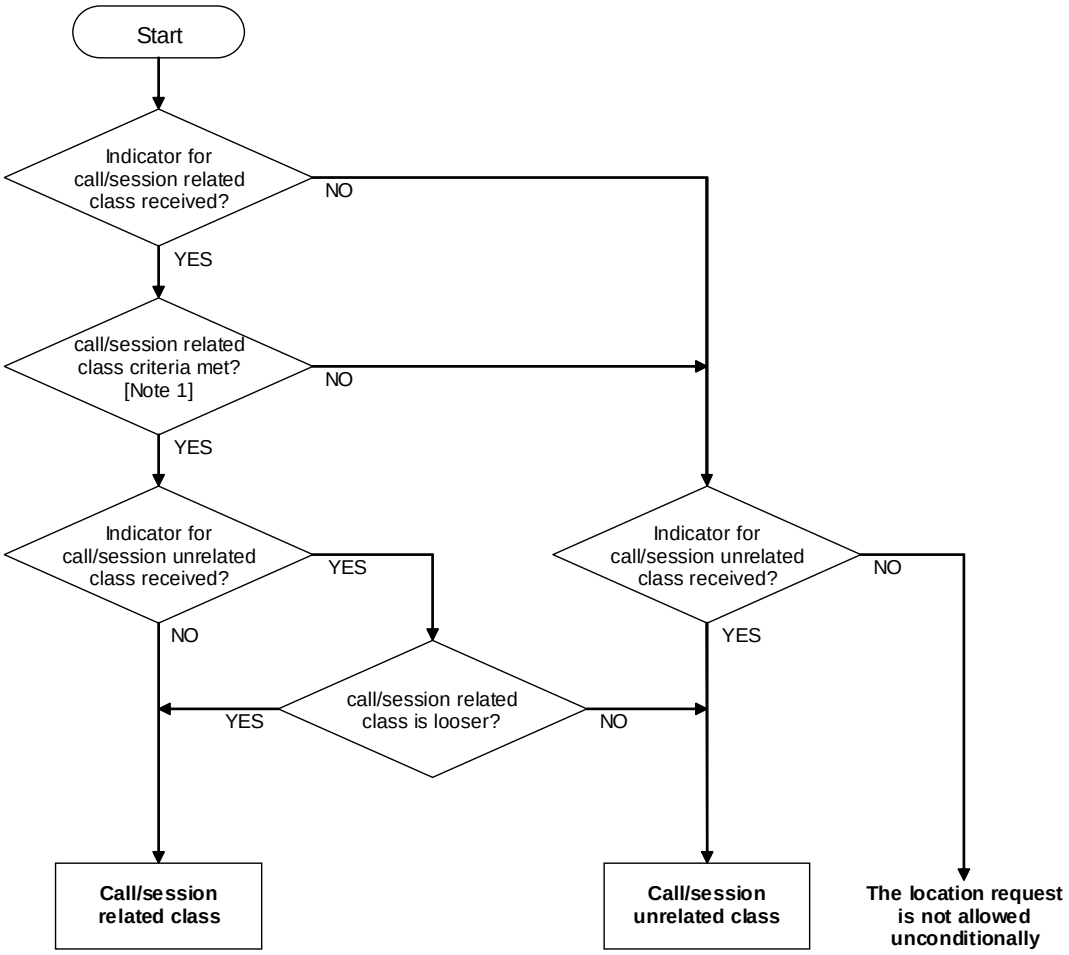

Figure A.2: Privacy related action selection flow diagram of the serving node

Note 1: The UE originated call/session to the requesting LCS client is established and the address associated to the LCS client used by the UE in call/session set up matches with that contained in the location request.

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Annex C (Informative): Pseudo external ID

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 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 10.2. 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.

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

Pseudo-external identity	Privacy setting for Call/Session related class	Privacy setting for Call/Session unrelated class
Pseudo-external identity 1	N.A.	Location allowed without notification
Pseudo-external identity 2	N.A.	Location allowed with notification
Pseudo-external identity 3	N.A.	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 4	N.A.	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 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		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 8	Location allowed with notification	Location not allowed
Pseudo-external identity 9		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 10		Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 11	Location allowed without notification	Location not allowed
Pseudo-external identity 12		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 13		Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 14		Location allowed with notification

Note: There are five privacy settings shown in Annex A.1 for each class (call/session unrelated class and call/session related class), so there are twenty-five possible combinations of the privacy settings. However, as shown in Annex A.2, even if the call/session related class criteria is met, the privacy setting

for call/session unrelated class is selected when the privacy setting for the call/session unrelated class is looser than the privacy setting for the call/session related class. Therefore the twenty-five combinations can be reduced to the above fourteen combinations.

If the UE subscribes to the universal class, H-GMLC/PPR sends the pseudo external identity 1 to the serving nodes.

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/PPR, the H-GMLC/PPR 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
Pseudo-external identity 1	Location allowed without notification
Pseudo-external identity 2	Location allowed with notification
Pseudo-external identity 3	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 4	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 5	Location not allowed
Pseudo-external identity 6	Location not allowed
Pseudo-external identity 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	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 10	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 11	Location not allowed
Pseudo-external identity 12	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 13	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 14	Location allowed with notification

Table C.3: Example of SLPP in HLR/HSS for Call/Session related Class

Pseudo-external identity	Privacy Setting

Pseudo-external identity 5	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 6	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 7	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 8	Location allowed with notification
Pseudo-external identity 9	Location allowed with notification
Pseudo-external identity 10	Location allowed with notification
Pseudo-external identity 11	Location allowed without notification
Pseudo-external identity 12	Location allowed without notification
Pseudo-external identity 13	Location allowed without notification
Pseudo-external identity 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
Location request is allowed without notification, regardless of on-going call/session.	Pseudo-external identity 1
Location request is allowed with notification, regardless of on-going call/session,	Pseudo-external identity 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
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
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
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
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
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	Pseudo-external identity 8

restricted.	
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
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
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
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 with notification and privacy verification. Location request is restricted if no response.	Pseudo-external identity 12
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
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