Technical Specification Group Services and System Aspects ***TSGS#18(02)0769***

Meeting #18, New Orleans, U.S.A., 9-12 December 2002

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 #18.

CRs applying to one Release:

Tdoc #	Title	Spec	CR #	cat	Version in	REL	WI	S2 meeting
S2-022960	Addition of reference number to deferred MT-LR procedure	23.271	132	F	4.7.0	4	LCS1	S2-27
S2-023029	Privacy class selection rule	23.271	108rev1	F	4.7.0	4	LCS	S2-27
S2-022961	Addition of reference number to deferred MT-LR procedure	23.271	133	F	5.4.0	5	LCS1	S2-27
S2-023024	Clarification of codeword handling mechanism	23.271	121rev1	F	5.4.0	5	LCS1	S2-27
S2-023030	Privacy class selection rule	23.271	109rev1	A	5.4.0	5	LCS1	S2-27
S2-022955	Privacy procedure correction	23.271	135	A	6.1.0	6	LCS2	S2-27
S2-022962	Addition of reference number to deferred MT-LR procedure	23.271	134	F	6.1.0	6	LCS1	S2-27
S2-023025	Codeword handling mechanism for Rel-6.	23.271	122rev1	C	6.1.0	6	LCS2-GMLC	S2-27
S2-023027	Correction to privacy check procedure	23.271	125rev1	C	6.1.0	6	LCS2	S2-27
S2-023028	Corrections to inter GMLC interface procedure	23.271	126rev1	F	6.1.0	6	LCS2	S2-27
S2-023031	Privacy class selection rule	23.271	136rev1	A	6.1.0	6	LCS1	S2-27
S2-023033	Handling of codeword in case of combined periodical/deferred MT-LR	23.271	137	A	6.1.0	6	LCS2	S2-27
S2-023039	Privacy check mechanism for Rel-6 LCS.	23.271	123rev2	B	6.1.0	6	LCS2-GMLC	S2-27
S2-023579	Improvements of inter GMLC interface procedures	23.271	138rev3	B	6.1.0	6	LCS2-GMLC	S2-28

3GPP TSG-SA2 #27 ***S2-022955***
Beijing, China, October 14 – 18, 2002

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CHANGE REQUEST

⌘ **23.271** **CR** **135** ⌘**rev** ⌘ Current version: **6.1.0** ⌘

*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:	⌘	Privacy procedure correction
Source:	⌘	SIEMENS AG
Work item code:	⌘	LCS2
Date:	⌘	09/10/2002
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:	⌘	a) The reference to the privacy class selection rules is described below the privacy procedures (clause 9.5.2); it belongs to the UE privacy options describing the classes (clause 9.5.3). b) The local regulatory procedures are described below the universal class (clause 9.5.3.1); it belongs to the privacy procedures (9.5.2). c) Text contained in the headline for universal class (clause 9.5.3.1) and in clause 9.5.3.2 should be removed. d) unclear description of the "call criteria class met" in the note 2 of annex A
Summary of change:	⌘	a) The reference to the privacy class selection rules should be improved and moved below the UE privacy options (clause 9.5.3). b) The local regulatory requirements should be moved below the privacy procedures (clause 9.5.2). c) Text contained in the headline for universal class (clause 9.5.3.1) and in clause 9.5.3.2 should be removed. d) the description of the "call criteria class met" in the note 2 of annex A should be improved
Consequences if not approved:	⌘	For a), b), c), d) – the text is difficult to find and understand

Clauses affected:	⌘	9.5.2, 9.5.3, 9.5.3.1, 9.5.3.2, annex A

		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.

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

9.5.2 Privacy Procedures

The SLPP shall contain the privacy options defined in the HLR of the UE subscriber.

The SLPP 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.

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). 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 more than one privacy class are subscribed, privacy class for an MT-LR is selected according to the rule described in the ANNEX A. ANNEX A applies also in case service types privacy checking are subscribed together with one or more other privacy classes.~~

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 with a cause code indicating that the request was rejected by the subscriber.

9.5.3 UE Privacy Options

The UE privacy options in the SLPP apply to an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR and either indicate that no CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR is allowed for the UE (except as may be overridden by the POI or local regulatory requirements) or define the particular classes of LCS client for which an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR for location are allowed, with the following classes being possible:

[Editor's note: An e-mail comment pointed out that there are different cases still to be covered in the description of the classes: 1. the LCS Client identity is included in SLPP or 2. the LCS Client identity is NOT included in SLPP. Also some GMLC restriction conditions need to be mentioned.]

a) Universal Class - allow positioning by all LCS clients;

b) Call/Session related Class

c) Call/Session-unrelated Class

d) PLMN operator Class

Moreover the SLPP may contain the service types allowed by the subscriber.
All UE privacy options of above four classes are commonly used for both CS and PS domain.
The privacy classes are selected according to the rules described in the ANNEX A. If more than one privacy class are subscribed in the UE's SLPP, the looser privacy setting shall be selected. ANNEX A applies also in case service types privacy checking are subscribed together with one or more other privacy classes.

Note: If a privacy option setting in a domain is updated, the same modification will be applied to the other domain.

9.5.3.1 ~~The classes and corresponding subscription options are described below.~~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 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.~~

9.5.3.2 Call/Session related class

When the user of the UE subscribes to the "Call/Session related Class" the CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR positioning is allowed in the following cases:

Allow positioning by specific identified value added LCS client or groups of value added LCS Client to which the UE originated a call in CS domain or a value added LCS client with which the UE has a session via an active PDP context in PS domain indicated by a specific APN-NI. ~~For all clients in the call related class, OR~~ For each identified LCS client or group of LCS Clients, one of the following subscription options shall apply:

* location request allowed only from GMLCs identified in the SLPP;
* location request allowed only from a GMLC in the home country;
* location request allowed from any GMLC (default case).

For each identified value added LCS client or group of LCS Clients in the privacy exception list, one of the following subscription options shall apply:

* positioning allowed without notifying the UE user (default case);
* 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.

For all value added LCS clients sending a call related CS-MT-LR/PS-MT-LR that are not identified in the privacy exception list, one of the following subscription option shall apply:

* positioning not allowed;
* positioning allowed without notifying the UE user (default case);
* 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.

NOTE 2: The usage of Call/Session related Class in the IM subsystem is FFS.

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

Annex A (normative): Privacy Class selection rule

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 according to the following flow diagram.

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

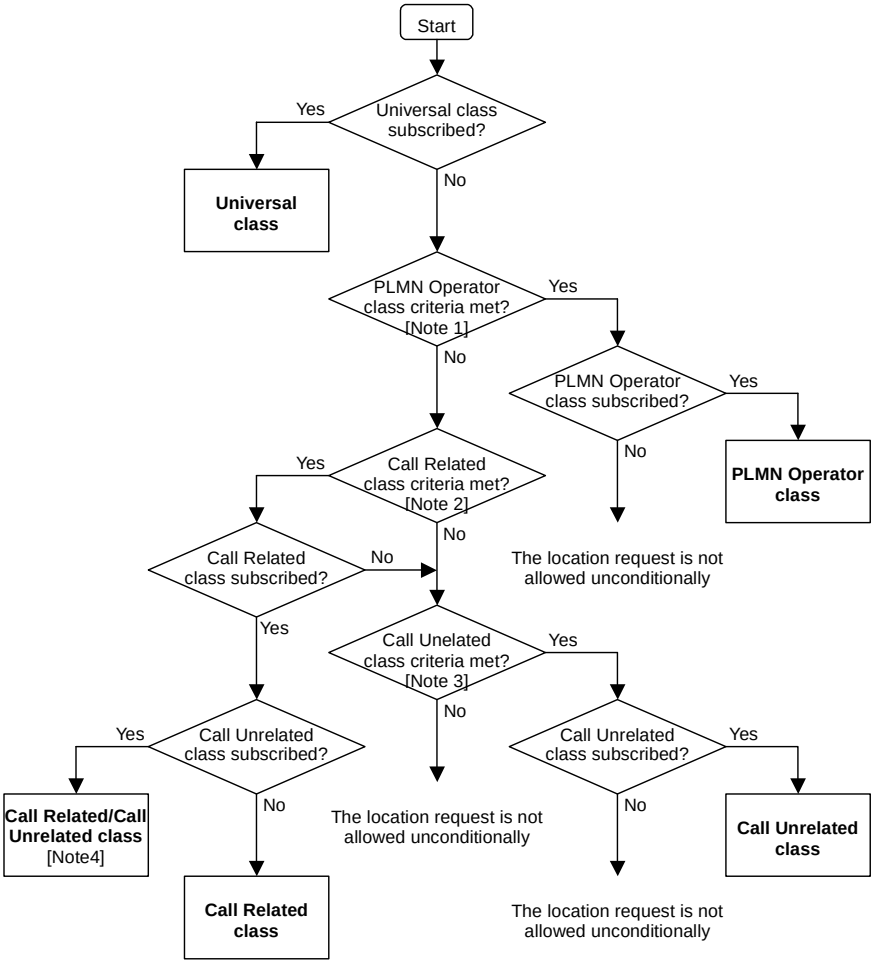

Figure A.1: Privacy Class selection flow diagram

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.~~and the Dialled by UE is available and matched with a call/session established.~~
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.

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11th – 15th November 2002

Tdoc ⌘S2-023579
~~(revised S2-023574)~~

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **138** ⌘**rev** **3** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Improvements of inter GMLC interface procedures.
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS2-GMLC
Date:	⌘	14/11/2002
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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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 handling of the emergency services is not specified in the current inter GMLC interface procedures. Also it is necessary to modify the deferred MT-LR procedures.
Summary of change:	⌘	The handling of emergency service is added and the deferred MT-LR procedures are modified.
Consequences if not approved:	⌘	The emergency services and the deferred MT-LRs do not work properly in Rel-6.

Clauses affected:	⌘	5.6.1, 6.2, 9.1.1, new 9.1.1A, 9.1.8.1, 9.1.8.2, 9.1.8.3, 10.5.1, 10.5.4.2			
Other specs affected:	⌘	**Y** / **N**		⌘	29.002
		X /	Other core specifications		
		/ **X**	Test specifications		
		/ **X**	O&M Specifications		
Other comments:	⌘	This CR includes the proposed changes in S2-023473 from TCS and Lucent. The changes for clause 9.1.1 in the approved CRs (CR122r1, CR123r2, CR125r1, CR126r1) are included in this CR. Therefore the changes for 9.1.1 in this CR overrides the changes in these CRs. The changes of 10.5.4.2 in this CR also override the changes in CR123r2.			

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5.6 Information Flows between LCS Servers

Other types of national specific information flows may be supported in addition to the information flow specified here.

Any of the information flows here indicated may not be externally realized if the information does not flow over an open interface. On the other hand, if a flow goes over an open interface, it shall abide to a well-defined protocol, which will be further specified in other relevant specifications.

When the LCS server's associated GMLC uses the Lr interface then this interface shall conform to the protocol as specified in (reference to be added) and the procedures defined in clause 9 of the current specification.

5.6.1 Location Service Request

Via the Location Service Request, the source LCS server communicates with the destination LCS server to request for the location information of one UE within a specified quality of service. There exist two types of location service requests:

- Location Immediate Request (LIR); and
- Location Deferred Request (LDR).

The following attributes are identified for Location Service Request information flow:

- Target UE identity, (one or both of MSISDN and IMSI);
- LCS Client identity, i.e. LCS client external identity or internal identity;
- LCS Client type, (i.e. Value added, Emergency, PLMN operator or Lawful interception);
- LCS Client name, if needed (and type of LCS client name if available);
- Service type, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Event, applicable to deferred location requests only;
- Requested Quality of Service information, if needed;
- Type of location, i.e. "current location", ~~or~~ "current or last known location" or "initial location";
- Priority, if needed;
- Privacy override indicator, if needed;
- Supported GAD shapes, if needed;
- Identity of the ~~S~~source LCS server of the Location Service Request ~~identity;~~;
- VPLMN LCS server address, if needed;
- Network address of Privacy Profile Register, if needed;
- Network ~~Address~~ numbers of serving nodes;
- LCS capability sets of serving nodes, if needed.

~~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.~~

5.6.2 Location Service Response

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

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

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

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 or local coordinate system;
- Acknowledgement for a deferred location request, if needed.

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

<< Next Change >>

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
	System handling component	Location System Control Function	LSCF
		Location System Billing Function	LSBF
		Location System Operations Function	LSOF
	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	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			
Subscriber handling functions								
LSAF			X~~, FFS~~	X	X		X	
LSPF			X~~, FFS~~	X	X	X	X	
Positioning functions								
PRCF		X						
PCF	X	X						
PSMF	X	X						
PRRM		X						
	UE	**RAN**	**GMLC**	**SGSN**	**MSC/MSC Server**	**HLR/HSS**	**PPR**	**Client**

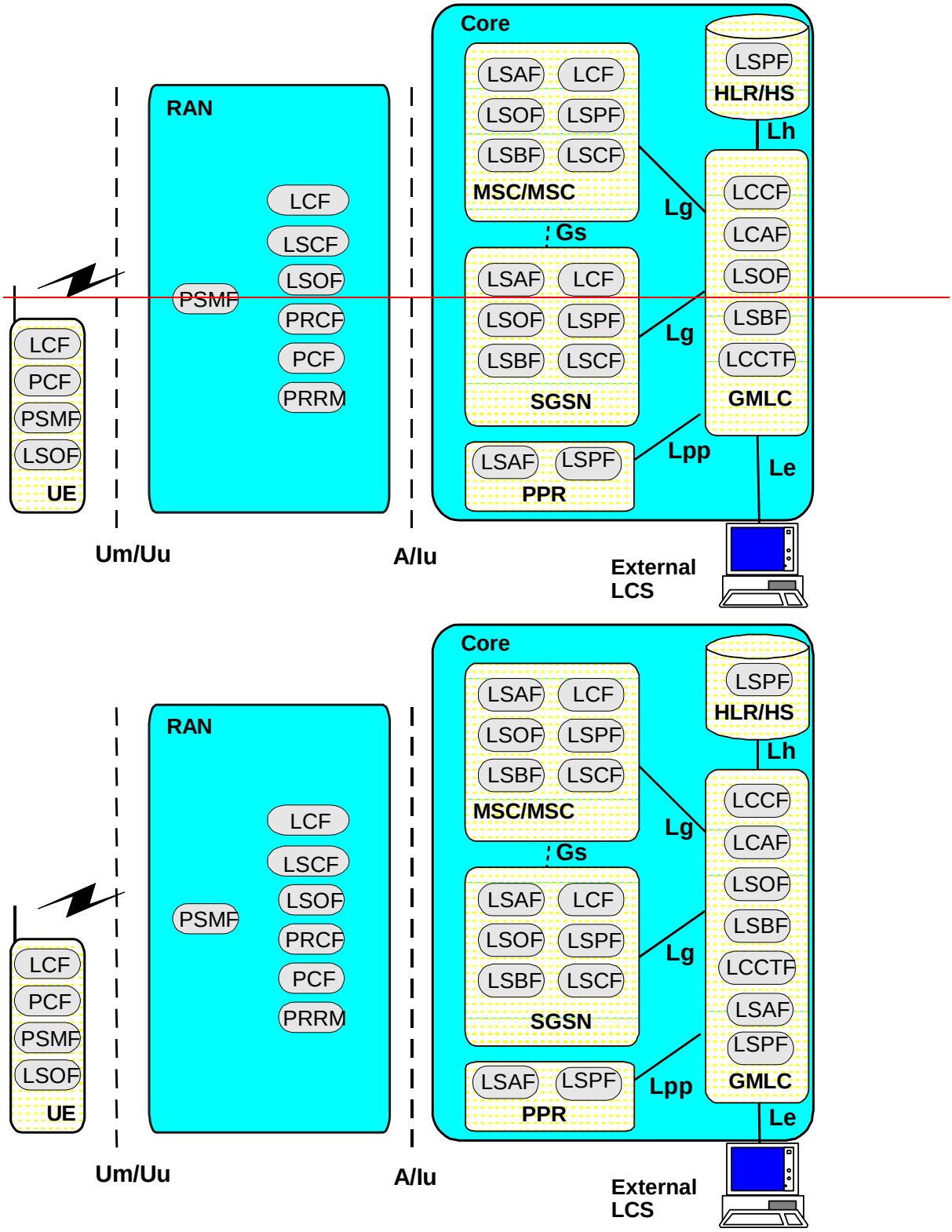


Figure 6.2: Generic LCS Logical Architecture

~~Editor's note: LSAF, LSPF should also be shown inside GMLC in Fig. 6.2.~~

<< Next Change >>

9.1 Mobile Terminating Location Request

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

9.1.1 MT-LR routing procedure in PS and CS domain

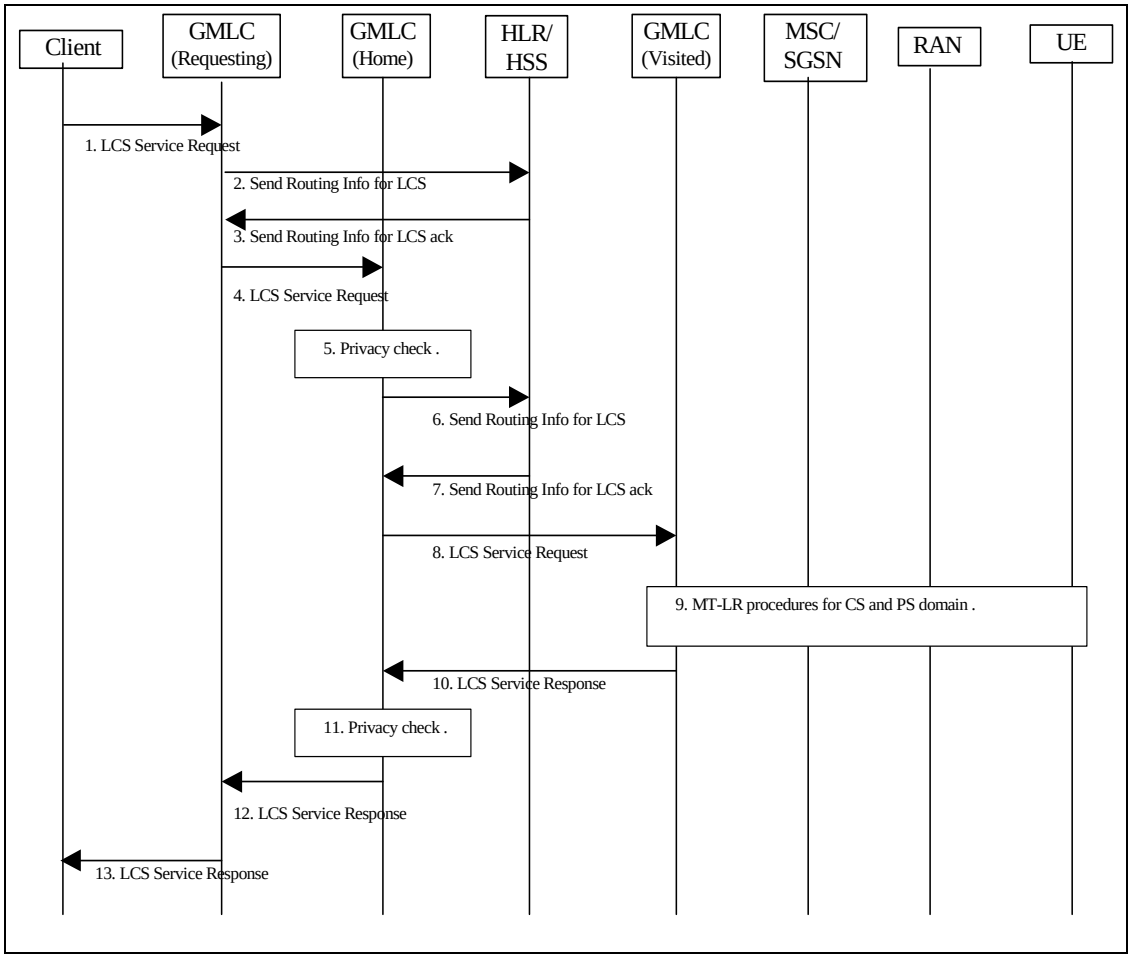


Figure 9.1: General Network Positioning for a MT-LR

~~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 R-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 R-GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.~~
~~The LCS request may carry also the Service Identity and the Codeword. 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. 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.

- 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.

Editor's note: This would mean that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain. It is for further study should H-GMLC handle the periodicity of location requests.

2) 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. If the R-GMLC supports the Lr interface, the R-GMLC capability information shall be included in the SEND_ROUTING_INFO_FOR_LCS message.
If the R-GMLC already knows, or is able to determine, the network address of H-GMLC of the target UE, (e.g. from a previous location request), then step 2 and step 3 may be skipped. One possibility could be to use a DNS lookup to determine the H-GMLC address, but this is FFS.

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.

3) The HLR/HSS verifies the R-GMLC's network address. The HLR/HSS may return the address of the PPR to the GMLC if available. The HLR/HSS then compares the R-GMLC address with the H-GMLC network address for the target UE. The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned. The HLR/HSS returns the address of the H-GMLC.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
The R-GMLC sends the location request to the H-GMLC.

5)The H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. 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 and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client.

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. 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 was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return 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.

8) The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).
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 forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN for the target UE. The forwarded 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 X). The V-GMLC first authenticates that the location request is allowed from this PLMN or from this country. If not, an error response is returned.~~
~~In the cases when the H-GMLC did not receive the address of the V-GMLC, when the V-GMLC address is the same with the H-GMLC address or when both PLMN operators agree not to use Lr interface, the H-GMLC does not forward the location request to the V-GMLC and step 10 is skipped.~~

~~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 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. UE 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).~~

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

~~11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check.~~

~~12) The H-GMLC sends the location service response to the R-GMLC.~~

~~13) 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 GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.~~

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 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 R-GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. 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. 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.
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.

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

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, 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 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 by 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.

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.
Otherwise the H-GMLC performs privacy check on the basis of the UE user's privacy profile stored in the H-GMLC and the capabilities of the serving nodes (MSC/VLR and/or SGSN) if available. The H-GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the key of the UE user's privacy profile (i.e. MSISDN or IMSI) is not available, the privacy check in this step shall be performed after the step 7. The H-GMLC/PPR verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC/PPR. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred, an error response is returned to the R-GMLC or the LCS client. As a result of the privacy check, the H-GMLC/PPR selects an indicator of the privacy check related action and/or a pseudo-external identity. (The details of the indicator of the privacy check related action and the pseudo-external identity are described in Annex C).

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. 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 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.
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 with the H-GMLC address, or when both PLMN operators agree not to use 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 for 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 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 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).

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

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check or the GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1.

12) The H-GMLC sends the location service response to the R-GMLC.

13) 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 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 Change >>

9.1.1A Routing 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.

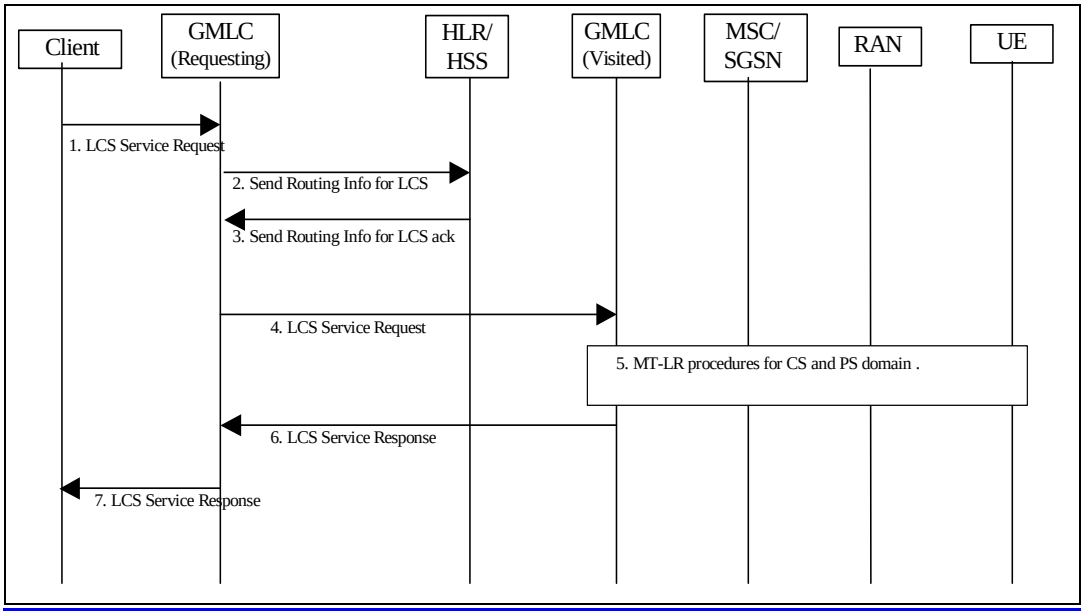


Figure 9.1A: Network Positioning for an Emergency MT-LR

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 both the VMSC/MSC server or SGSN location or the network address of V-GMLC and IMSI for the particular MSISDN, (e.g. from a previous location request), 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 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 with the R-GMLC address, or when both PLMN operators agree not to use 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 for the target UE and the privacy override indicator. The V-GMLC first authenticates that the location request is allowed from this 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 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.

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

<< Next Change >>

9.1.8 Mobile Terminating Deferred Location Request

Figure 9.6a illustrates the procedures for a Deferred Location Request, where the Location Report is returned based on a event.

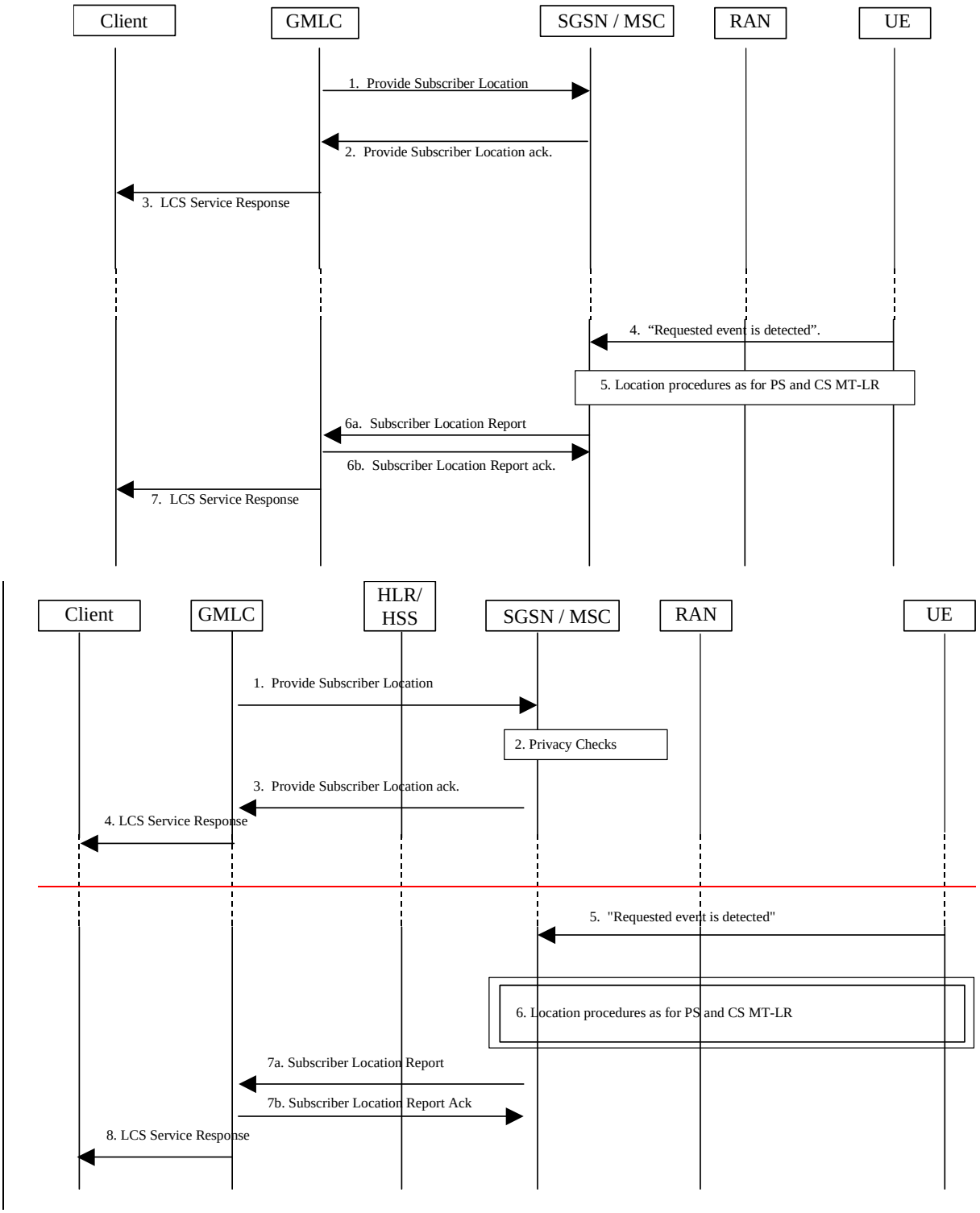


Figure 9.6a: General Network Positioning for a Deferred MT-LR

9.1.8.1 Deferred Location Request Procedure

1) Provide Subscriber Location is received in SGSN/MSC as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the event that shall trigger the sending of Location Report.

2) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned ~~in step 3~~ with a suitable cause.

~~The SGSN/MSC verifies that the LCS client is allowed to position the requested UE according to subscription information (no interaction at this stage with the UE). If not, a Provide Subscriber Location return error is returned in step 3.~~If the SGSN/MSC can support the deferred location request for the specified event, a Provide Subscriber Location ack. shall be returned to the GMLC without a location estimate.

~~3) If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks in step 2 are satisfied, a Provide Subscriber Location ack. shall be returned to the GMLC without a location estimate.~~

~~4~~3) The GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC to notify whether the request was successfully accepted or not.

9.1.8.2 Location Report Procedure

~~5~~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 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.

~~6~~5) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

If either security or privacy check related action~~s~~ fails, a Subscriber Location Report is returned with appropriate error cause indicating termination of the deferred location request.

~~7~~6) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. Included in the report is an indication that this is a response to a previously sent deferred location request.

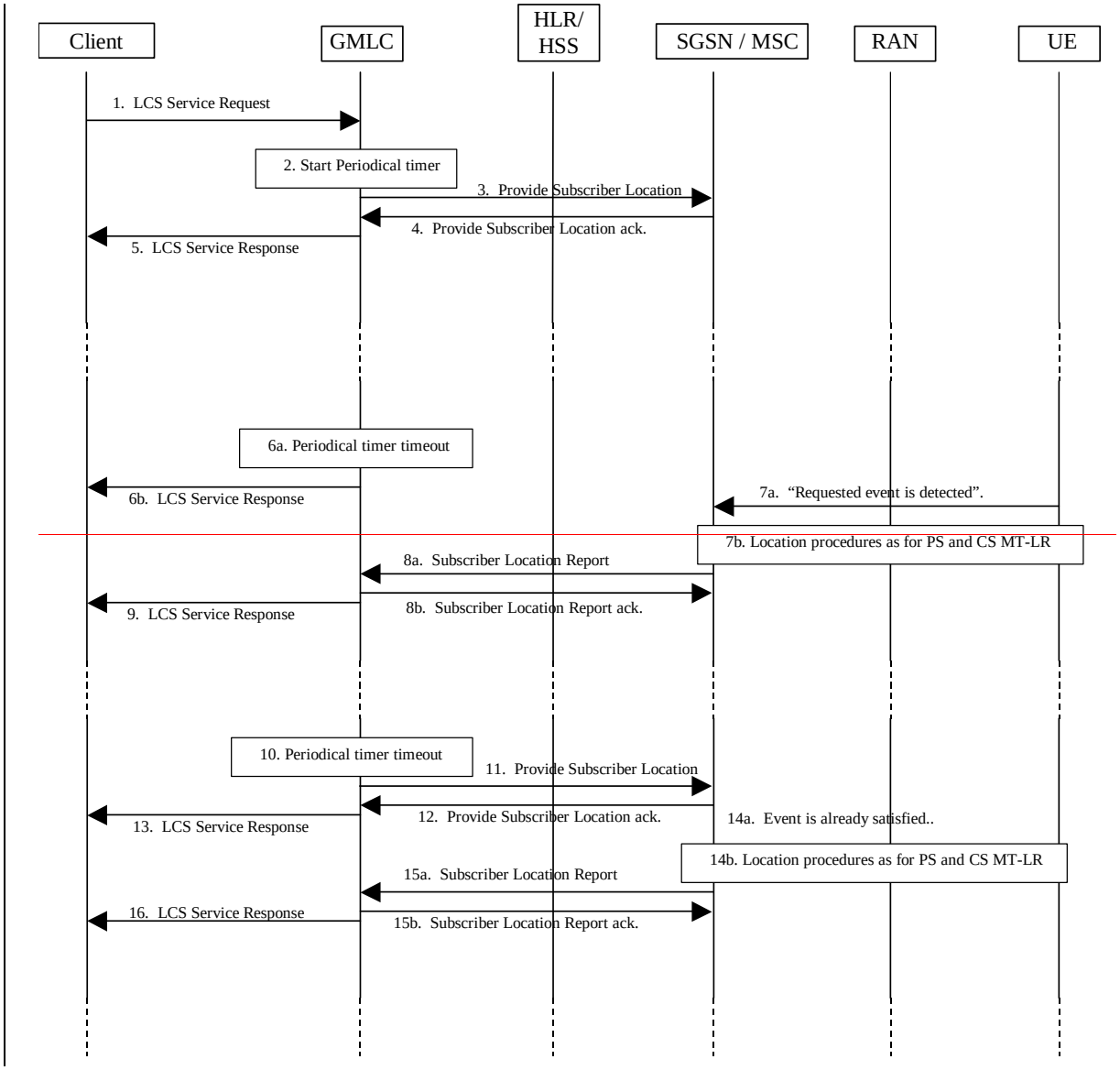
If the location information could not be obtained, or the SGSN/MSC for some other reason decides to not wait any longer for the requested event to occur (ex. timer expires), the Subscriber Location Report will be returned with an appropriate error cause indicating termination of the deferred location request.

~~8~~7) GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC as in ~~9.1.2/9.1.6~~9.1.1.

9.1.8.3 Combined Periodical/Deferred Mobile Terminating Location Request

Figure 9.6b illustrates the procedures for a Combined Periodical/Deferred Mobile Terminating Location Request, where the response to the LCS client is returned periodically and based on the event.

Note: In the current specification, it is assumed the LCS client issues the Periodical/Deferred MT-LR with only the location estimate type of “current location”.


Client
GMLC
HLR/ HSS
SGSN / MSC
RAN
UE
1. LCS Service Request
2. Start Periodical timer
3. Provide Subscriber Location
4. Provide Subscriber Location ack.
5. LCS Service Response
6a. Periodical timer timeout
6b. LCS Service Response
7a. "Requested event is detected".
7b. Location procedures as for PS and CS MT-LR
8a. Subscriber Location Report
8b. Subscriber Location Report ack.
9. LCS Service Response
10. Periodical timer timeout
11. Provide Subscriber Location
12. Provide Subscriber Location ack.
13. LCS Service Response
14a. Event is already satisfied..
14b. Location procedures as for PS and CS MT-LR
15a. Subscriber Location Report
15b. Subscriber Location Report ack.
16. LCS Service Response

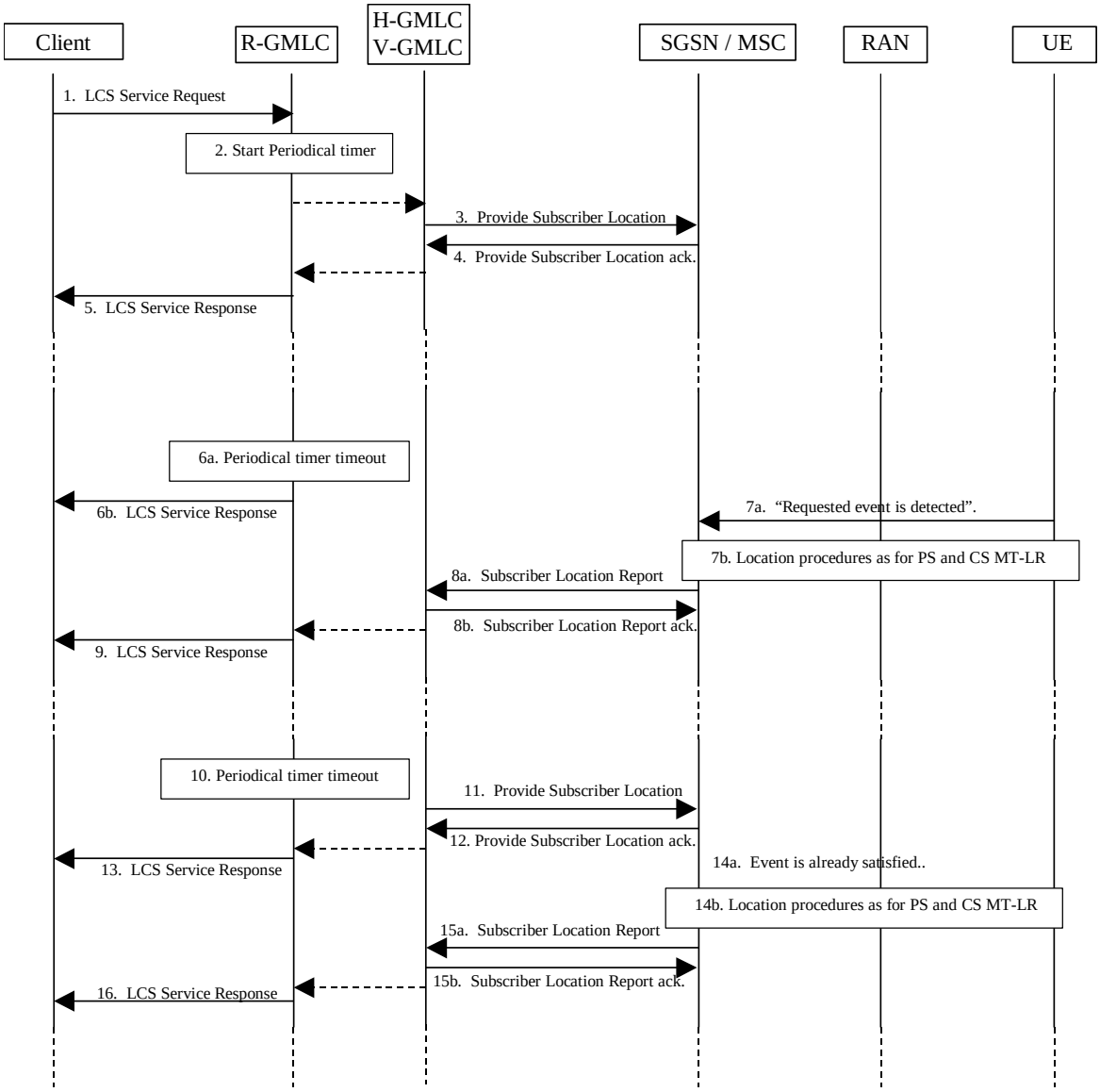


Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

1) When a R-GMLC receives a LCS Service Request from a LCS client, the R-GMLC verifies the identity of the LCS client as described in 9.1.1.

2) The GMLC starts the periodical timer, and initiates the common LCS procedures as described in 9.1.1. ~~sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and gets SGSN/MSC addresses from the HLR/HSS as described in 9.1.1.~~ 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), the Send Routing Info is not sent to the HLR/HSS.

3) The GMLC sends a Deferred Location Request to the SGSN/MSC by means of Provide Subscriber Location as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the event that shall trigger the sending of Subscriber Location Report.

4) If the SGSN/MSC cannot support the deferred location request for the specified event or the LCS client is not allowed to position the requested UE according to subscription information, a Provide Subscriber Location error is returned to the GMLC. If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks are satisfied, a Provide Subscriber Location ack shall be returned to the GMLC without a location estimate.

5) The GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC to notify whether the request was successfully accepted or not.

6) When the periodical timer expires, if the R-GMLC is still waiting for the event, the R-GMLC shall send a LCS Service Response to the LCS client, indicating that the location is not available at that moment.

7) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

8) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report includes 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 will be returned with an appropriate error cause indicating termination of the deferred location request.

9) The GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC as in 9.1.2/9.1.6.

10) When the timer expires, if the R-GMLC is not waiting for the event, the R-GMLC initiates the common LCS procedures as described in 9.1.1. ~~sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and receives SGSN/MSC addresses from the HLR/HSS as described in 9.1.1.~~ 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), the Send Routing Info is not sent to the HLR/HSS.

11) Same as step 3.

12) Same as step 4.

13) Same as step 5.

14) If the requested event is already satisfied, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

15) Same as step 8.

16) Same as step 9.

<< Next Change >>

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

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.

~~The GMLC, which notified the HLR/HSS by Send Routing Info request message that it supports LCS capability set 4, shall support Lr interface.~~

<< Next Change >>

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.

~~10.5.4.2 Rel-6 or later HLR/HSS with pre Rel-6 GMLC~~

~~If the Rel-6 or later HLR/HSS is notified by Send Routing Info request message that the LCS capability set 4 is not supported by the GMLC and the GMLC is not the H-GMLC of the target UE, the HLR/HSS decides whether the location estimation process can be continued or not.~~

[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.][Note2: the concept of LCS capability set is introduced in Rel4 so that it doesn't appear in the specifications for R98 and R99 LCS]

3GPP TSG-SA2 #28 **S2-023343**
Bangkok, Thailand, 11 – 15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **03.32** **CR** **7** ⌘**rev** **2** ⌘ Current version: **7.1.0** ⌘

*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 [X] Radio Access Network [X] Core Network [X]

Title:	⌘	Coding of Maximum Offset and Included angle.
Source:	⌘	SIEMENS AG
Work item code:	⌘	LCS
Date:	⌘	06/11/2002
Category:	⌘	**F**
Release:	⌘	R98

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:	⌘	It is ambiguous how the ranges for offset and included angle should be coded.
Summary of change:	⌘	It has been described, that there are different ranges for offset and included angle. Some editorial errors are also corrected. The decimal point in the related tables has been replaced by comma following the rules defined in TS21.801.
Consequences if not approved:	⌘	The angles for offset and included could be wrongly coded.

Clauses affected:	⌘	Section 5.7, 6.2, 6.4, 6.6, 6.7			
		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.

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

5.7 Ellipsoid Arc

An ellipsoid arc is a shape characterised by the co-ordinates of an ellipsoid point *o* (the origin), innerouter radius *r1*, uncertaintyinner radius *r2*, both radii being geodesic distances over the surface of the ellipsoid, the offset angle (θ) between the first defining radius of the ellipsoid arc and North, and the included angle (β) being the angle between the first and second defining radii.start angle *a1* and stop angle *a2*. Start and stop angle, (*a1* and *a2*) are defined as the angle clockwise from north. The offset start angle is within the range of 0° to 359,999…° while the included stop angle is within the range from 0,000…1° to 360°. This is to be able to describe a full circle, 0° to 360°.

This shape-definition can also be used to describe a sector (inner radius equal to zero),; a circle (included angle equal to 360°) and other circular shaped areas. The confidence level with which the position of a target entity is included within the shape is also included.

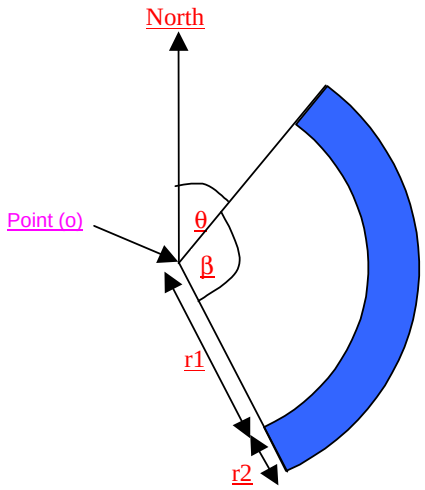


Figure 3c: Description of an Ellipsoid Arc

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

6 Coding

6.1 Point

The co-ordinates of an ellipsoid point are coded with an uncertainty of less than 3 metres

The latitude is coded with 24 bits: 1 bit of sign and a number between 0 and 2^{23}-1 coded in binary on 23 bits. The relation between the coded number N and the range of (absolute) latitudes X it encodes is the following (X in degrees):

$$N \le \frac{2^{23}}{90} X < N + 1$$

except for N=2^{23}-1, for which the range is extended to include N+1.

The longitude, expressed in the range -180°, +180°, is coded as a number between -2^{23} and 2^{23}-1, coded in 2's complement binary on 24 bits. The relation between the coded number N and the range of longitude X it encodes is the following (X in degrees):

$$N \le \frac{2^{24}}{360} X < N + 1$$

6.2 Uncertainty

A method of describing the uncertainty for latitude and longitude has been sought which is both flexible (can cover wide differences in range) and efficient. The proposed solution makes use of a variation on the Binomial expansion. The uncertainty *r*, expressed in metres, is mapped to a number K, with the following formula:

$$r = C\left((1+x)^K - 1\right)$$

with C = 10 and x = 0,1. With 0 ≤ K ≤ 127, a suitably useful range between 0 and 1800 kilometres is achieved for the uncertainty, while still being able to code down to values as small as 1 metre. The uncertainty can then be coded on 7 bits, as the binary encoding of K.

Table 1: Example values for the uncertainty Function

Value of K	Value of uncertainty
0	0 m
1	1 m
2	2,1 m
-	-
20	57,3 m
-	-
40	443 m
-	-
60	3 km
-	-
80	20 km
-	-
100	138 km
-	-
120	927 km
-	-
127	1800 km

6.3 Altitude

Altidude is encoded in increments of 1 meter using a 15 bit binary coded number N. The relation between the number N and the range of altitudes *a* (in metres) it encodes is described by the following equation;

$$N \le a < N + 1$$

except for N=2^{15}-1 for which the range is extended to include all greater values of *a.*

The direction of altitude is encoded by a single bit with bit value 0 representing height above the WGS84 ellipsoid surface and bit value 1 representing depth below the WGS84 ellipsoid surface.

6.4 Uncertainty Altitude

The uncertainty in altitude, h, expressed in metres is mapped from the binary number K, with the following formula:

$$h = C\left((1+x)^K - 1\right)$$

with C = 45 and x = 0,025. With 0 ≤ K ≤ 127, a suitably useful range between 0 and 990 meters is achieved for the uncertainty altitude,. The uncertainty can then be coded on 7 bits, as the binary encoding of K.

Table 2: Example values for the uncertainty altitude Function

Value of K	Value of uncertainty altitude
0	0 m
1	1,13 m
2	2,28 m
-	-
20	28,7 m
-	-
40	75,8 m
-	-
60	153,0 m
-	-
80	279,4 m
-	-
100	486,6 m
-	-
120	826,1 m
-	-
127	990,5 m

6.5 Confidence

The confidence by which the position of a target entity is known to be within the shape description, (expressed as a percentage) is directly mapped from the 7 bit binary number K, except for K=0 which is used to indicate ‘no information’, and 100 < K ≤128 which should not be used but may be interpreted as “no information” if received.

6.6 Radius

Inner Rradius is encoded in increments of 5 meters using a 16 bit binary coded number N. The relation between the number N and the range of radius *r* (in metres) it encodes is described by the following equation;

$$5N \le r < 5(N + 1)$$

Except for N=2^{16}-1 for which the range is extended to include all greater values of *r*. This provides a true maximum radius of 327,675 meters.

The uncertainty radius is encoded as for the uncertainty latitude and longitude.

6.7 Angle

Offset and Included ~~A~~angle are~~is~~ encoded in increments of 2~~1~~° using an ~~9~~8 bit binary coded number N in the range 0 to 179. The relation between the number N and the range of offset (ao) and included (ai) angles ~~*a*~~ (in degrees) it encodes is described by the following equations;

Offset angle (ao)

2 N <= ao < 2 (N+1) Accepted values for ao are within the range from 0 to 359,9...9 degrees.

Included angle (ai)

2 N < ai <= 2 (N+1) Accepted values for ai are within the range from 0,0...1 to 360 degrees.

~~2 N ≤ a < 2 (N+1)~~ $N \leq a < N+1$

~~Accepted values foron *a* are within the range from 0 to 360 degrees.~~

3GPP TSG-SA2 Meeting #27
Beijing, China, 14th – 18th October 2002

Tdoc ⌘S2-023039

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **123** ⌘**rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Privacy check mechanism for Rel-6 LCS.
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS2-GMLC ***Date:*** ⌘ 16/10/2002
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 specification, the description of the privacy profile data stored in H-GMLC/PPR and the handling of the pseudo-external identity are not clear.
Summary of change:	⌘	The description of the privacy profile data stored in H-GMLC/PPR and the handling of the pseudo-external identity are clarified.
Consequences if not approved:	⌘	The description of the privacy profile data stored in H-GMLC/PPR and the handling of the pseudo-external identity remain unclear.

Clauses affected:	⌘	5.6.1, 9.1.1, 10.1, 10.1.1, 10.3.2, 10.5.4.2, Annex C

		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.

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;
- LCS Client identity;
- LCS Client name, if needed (and type of LCS client name if available);
- Service type, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Event, applicable to deferred location requests only;
- Requested Quality of Service information, if needed;
- Type of location, i.e. current location or last known location;
- Priority, if needed;
- Privacy override indicator, if needed;
- Indicator of privacy check related actions, if needed;
- Supported GAD shapes, if needed;
- Source LCS server identity;
- Address of serving node

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 change>>>

9.1.1 MT-LR routing procedure in PS and CS domain

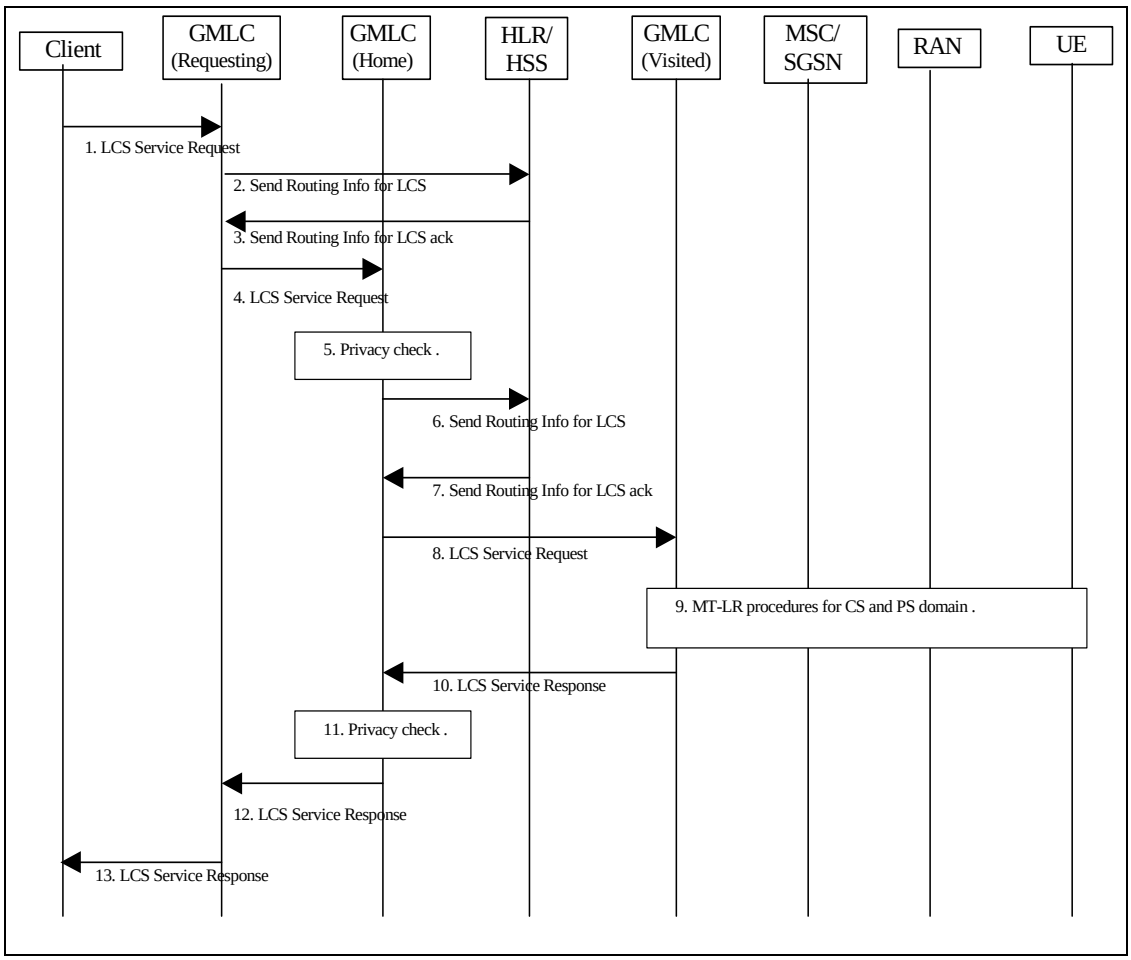

Figure 9.1: General Network Positioning for a MT-LR

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 R-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 R-GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. 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. 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.

   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.

Editor's note: This would mean that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain. It is for further study should H-GMLC handle the periodicity of location requests.

2) 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. If the R-GMLC supports the Lr interface, the R-GMLC capability information shall be included in the SEND_ROUTING_INFO_FOR_LCS message.
If the R-GMLC already knows, or is able to determine, the network address of H-GMLC of the target UE, (e.g. from a previous location request), then step 2 and step 3 may be skipped. One possibility could be to use a DNS lookup to determine the H-GMLC address, but this is FFS.

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.

3) The HLR/HSS verifies the R-GMLC's network address. The HLR/HSS may return the address of the PPR to the GMLC if available. The HLR/HSS then compares the R-GMLC address with the H-GMLC network address for the target UE. The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned. The HLR/HSS returns the address of the H-GMLC.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
The R-GMLC sends the location request to the H-GMLC.

5) The H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. 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 and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client. As a result of the privacy check, the H-GMLC/PPR selects an indicator of the privacy check related action and/or a pseudo-external identity. (The details of the indicator of the privacy check related action and the pseudo-external identity are described in Annex C).

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. 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 was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return 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.

8) The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).
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 forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN for the target UE. The forwarded 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 X). The V-GMLC first authenticates that the location request is allowed from this PLMN or from this country. If not, an error response is returned.
In the cases when the H-GMLC did not receive the address of the V-GMLC, when the V-GMLC address is the

same with the H-GMLC address or when both PLMN operators agree not to use Lr interface, the H-GMLC does not forward the location request to the V-GMLC and step 10 is skipped.

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 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. UE 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).

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

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check.

12) The H-GMLC sends the location service response to the R-GMLC.

13) 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 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 change>>>

10.1 HLR and HSS

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

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

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

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

Table 10.1: Logical States for each LCS Privacy Class

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

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

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

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

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

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

In case that UE's privacy profile is stored and is checked in the GMLC (H-GMLC) or in the PPR, pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.1. 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.

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

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

Table 10.4: Logical States for each Mobile Originating LCS Class

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

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

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

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

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

Table 10.6a: Temporary LCS data in the HLR

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

~~**Table 10.6b: Codeword handling information stored in the HLR**~~

~~Other Data in the HLR~~	~~Status~~	~~Description~~
~~Codeword handling information~~	~~O~~	~~Indication of one of the following mutually exclusive options for codeword:~~ ~~- codeword check is not required~~ ~~- codeword shall be checked in network.~~ ~~- codeword shall be sent to UE~~

<<<Next change>>>

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.

~~The GMLC/PPR may store a list of Codewords given by the UE subscriber, to be provided by the LCS client in order not to get the location request rejected.~~

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.

Table 10.12a: Codeword handling information stored in the GMLC

Other Data in the GMLC	Status	Description
Codeword handling information	O	Indication of one of the following mutually exclusive options for codeword: • codeword shall be checked in network. • codeword shall be sent to UE

Table 10.12b: LCS data stored in the GMLC for a UE Subscriber

LCS Privacy profile	Status	Additional GMLC data when profile is provisioned
Codeword	O	A list of codeword.

The GMLC (H-GMLC) or the PPR may store additional privacy information in order protect UE users privacy. The details of the additional privacy check are defined by each network operator and are outside the scope of this specification.

<<<Next change>>>

10.5.4.2 Rel-6 or later HLR/HSS with ~~pre Rel-6~~ GMLC which does not support Lr interface

If the Rel-6 or later HLR/HSS is notified by Send Routing Info request message that the LCS capability set 4 is not supported by the GMLC and the GMLC is not the H-GMLC of the target UE, the HLR/HSS decides whether the location estimation process can be continued or not.

[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.][Note2: the concept of LCS capability set is introduced in Rel4 so that it doesn't appear in the specifications for R98 and R99 LCS]

<<<Next change>>>

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

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

The pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.1. The pseudo-external identity is not the identity of real external LCS client but the identity which is used for notifying SGSN/MSC of the location request class (call/session related or non-related) and the required type of indication for each class. Operator allocates E.164 addresses for the pseudo-external identities. The pseudo-external identities are used for interworking with pre Rel-6 serving nodes.

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

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

Table C.1: Pseudo-external identities and Indicators of privacy check related action

Pseudo-external identity and Indicator of privacy check related action	Privacy setting for Call/Session related class	Privacy setting for Call/Session unrelated class
Pseudo-external identity 1 Indicator 1	N.A.	Location allowed without notification
Pseudo-external identity 2 Indicator 2	N.A.	Location allowed with notification
Pseudo-external identity 3 Indicator 3	N.A.	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 4 Indicator 4	N.A.	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 5 Indicator 5	Location with notification and privacy verification; location restricted if no response	Location not allowed
Pseudo-external identity 6 Indicator 6	Location with notification and privacy verification; location allowed if no response	Location not allowed
Pseudo-external identity 7 Indicator 7		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 8 Indicator 8	Location allowed with notification	Location not allowed
Pseudo-external identity 9 Indicator 9		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 10 Indicator 10		Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 11 Indicator 11	Location allowed without notification	Location not allowed
Pseudo-external identity 12 Indicator 12		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 13 Indicator 13		Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 14 Indicator 14		Location allowed with notification

Usage of the pseudo-external identities are as follows:

- The pseudo-external identities are registered in SLPP of the HLR/HSS.
- The SLPP is sent to the serving nodes, during the Insert Subscriber Data procedures.
- After the privacy check in the H-GMLC, the H-GMLC selects an appropriate pseudo-external identity according to the required privacy related actions (i.e. checking the on-going call/session and/or notification/verification procedures) in the serving node.
- H-GMLC sends Provide Subscriber Location message to the serving node, which includes the pseudo-external identity instead of the real external client identity. The real external client identity may be included in the additional information element and is sent to serving node.

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 and Indicator of privacy	Privacy Setting

check related action	
Pseudo-external identity 1 Indicator 1	Location allowed without notification
Pseudo-external identity 2 Indicator 2	Location allowed with notification
Pseudo-external identity 3 Indicator 3	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 4 Indicator 4	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 5 Indicator 5	Location not allowed
Pseudo-external identity 6 Indicator 6	Location not allowed
Pseudo-external identity 7 Indicator 7	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 8 Indicator 8	Location not allowed
Pseudo-external identity 9 Indicator 9	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 10 Indicator 10	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 11 Indicator 11	Location not allowed
Pseudo-external identity 12 Indicator 12	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 13 Indicator 13	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 14 Indicator 14	Location allowed with notification

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

Pseudo-external identity and Indicator of privacy check related action	Privacy Setting
Pseudo-external identity 5 Indicator 5	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 6 Indicator 6	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 7 Indicator 7	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 8 Indicator 8	Location allowed with notification
Pseudo-external identity 9 Indicator 9	Location allowed with notification
Pseudo-external identity 10 Indicator 10	Location allowed with notification
Pseudo-external identity 11 Indicator 11	Location allowed without notification
Pseudo-external identity 12 Indicator 12	Location allowed without notification
Pseudo-external identity 13 Indicator 13	Location allowed without notification
Pseudo-external identity 14 Indicator 14	Location allowed without notification

The selection of pseudo-external identity is based on the result of the privacy check in the H-GMLC/PPR. Table C.4 shows the relation between privacy check result and the pseudo-external identities.

Table C.4: Pseudo-external identity selection at H-GMLC/PPR

Privacy related actions as a result of privacy check	Pseudo-external identity and Indicator of privacy check related action
Location request is allowed without notification, regardless of on-going call/session.	Pseudo-external identity 1 Indicator 1
Location request is allowed with notification, regardless of on-going call/session,	Pseudo-external identity 2 Indicator 2
Location request is allowed with notification and privacy verification, regardless of on-going call/session. Location request is allowed even if there is no response from UE.	Pseudo-external identity 3 Indicator 3
Location request is allowed with notification and privacy verification, regardless of on-going call/session. Location request is restricted if there is no response from UE.	Pseudo-external identity 4 Indicator 4
If there is call/session with the client, location request is allowed with notification and privacy verification. Location request is restricted if there is no response from UE. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 5 Indicator 5
If there is call/session with the client, location request is allowed with notification and privacy verification. Location request is allowed even if there is no response from UE. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 6 Indicator 6
If there is call/session with the client, location request is allowed with notification and privacy verification. Location request is allowed even if there is no response from UE. If there is no call/session with the client, location request is allowed with notification and privacy verification. Location request is restricted if no response.	Pseudo-external identity 7 Indicator 7
If there is call/session with the client, location request is allowed with notification. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 8 Indicator 8
If there is call/session with the client, location request is allowed with notification. If there is no call/session with the client, location request is with notification and privacy verification. Location request is restricted if no response.	Pseudo-external identity 9 Indicator 9
If there is call/session with the client, location request is allowed with notification. If there is no call/session with the client, location request is allowed even if there is no response from UE.	Pseudo-external identity 10 Indicator 10
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 11 Indicator 11
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is	Pseudo-external identity 12 Indicator 12

with notification and privacy verification. Location request is restricted if no response.	
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is allowed even if there is no response from UE.	Pseudo-external identity 13 Indicator 13
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is allowed with notification.	Pseudo-external identity 14 Indicator 14

3GPP TSG SA WG2 Meeting # 27 **S2-023033**
Beijing, China, 14th – 18th October 2002

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CHANGE REQUEST

⌘ **23.271** **CR** **137** ⌘**rev** **-** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Handling of codeword in case of combined periodical/deferred MT-LR
Source:	⌘	Ericsson
Work item code:	⌘	LCS2
Date:	⌘	11/10/2002
Category:	⌘	**A**
Release:	⌘	Rel-6

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

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

Reason for change:	⌘	The current handling of the combined/periodical deferred MT-LR does not include the handling of the codeword agreed in SA2 for the general MT-LR procedure, as stated in ch. 9.1.1. In this chapter the conditions under which the GMLC can avoid sending MAP SEND_ROUTING_INFO_FOR_LCS are stated.
Summary of change:	⌘	The GMLC handling a combined periodical/deferred MT-LR shall satisfy the general handling of codeword for MT-LR, as stated in ch. 9.1.1.
Consequences if not approved:	⌘	The handling of combined periodical/deferred MT-LR is not aligned to the general codeword handling for MT-LR. Possible privacy violation in case of combined periodical/deferred MT-LR because the correct handling of codeword functionality may be skipped by the GMLC.

Clauses affected:	⌘	9.1.8.3
Other specs affected:	⌘	Y / N ☐ / ☒ Other core specifications ☐ / ☒ Test specifications ☐ / ☒ 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.

9.1.8.3 Combined Periodical/Deferred Mobile Terminating Location Request

Figure 9.6b illustrates the procedures for a Combined Periodical/Deferred Mobile Terminating Location Request, where the response to the LCS client is returned periodically and based on the event.

Note: In the current specification, it is assumed the LCS client issues the Periodical/Deferred MT-LR with only the location estimate type of "current location".

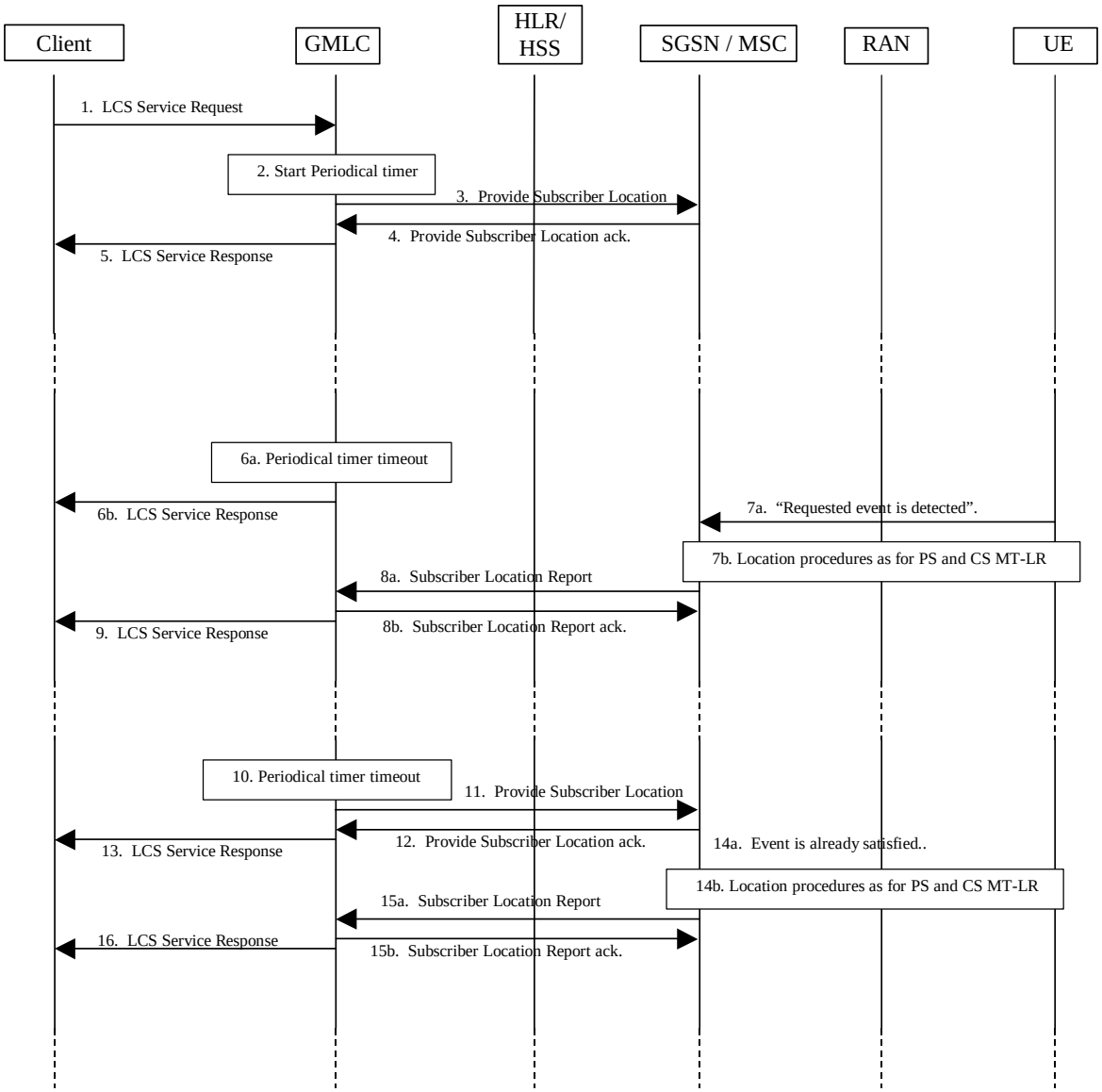

Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

1) When a GMLC receives a LCS Service Request from a LCS client, the GMLC verifies the identity of the LCS client as described in 9.1.1.

2) The GMLC starts the periodical timer, sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and gets SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. ~~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), the Send Routing Info is not sent to the HLR/HSS.~~

3) The GMLC sends a Deferred Location Request to the SGSN/MSC by means of Provide Subscriber Location as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the event that shall trigger the sending of Subscriber Location Report.

4) If the SGSN/MSC cannot support the deferred location request for the specified event or the LCS client is not allowed to position the requested UE according to subscription information, a Provide Subscriber Location error is returned to the GMLC. If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks are satisfied, a Provide Subscriber Location ack shall be returned to the GMLC without a location estimate.

5) The GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not.

6) When the periodical timer expires, if the GMLC is still waiting for the event, the GMLC shall send a LCS Service Response to the LCS client, indicating that the location is not available at that moment.

7) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

8) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report includes 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 will be returned with an appropriate error cause indicating termination of the deferred location request.

9) GMLC then returns the LCS Service Response to the LCS Client as in 9.1.2/9.1.6.

10) When the timer expires, if the GMLC is not waiting for the event, the GMLC sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and receives SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. ~~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), the Send Routing Info is not sent to the HLR/HSS.~~

11) Same as step 3.

12) Same as step 4.

13) Same as step 5.

14) If the requested event is already satisfied, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

15) Same as step 8.

16) Same as step 9.

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~~(Revised S2-023013)~~

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CHANGE REQUEST

⌘ **23.271** **CR** **136** ⌘**rev** **1** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Privacy class selection rule
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	17/10/2002
Category:	⌘	**A**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The text of the call/session related/unrelated and service type privacy is not inline with the diagram in annex A
Summary of change:	⌘	The text is adapted to the diagram in annex A
Consequences if not approved:	⌘	The ambiguity between text and the diagram remains for the call/session related/unrelated and service type privacy

Clauses affected:	⌘	Section 9.5.3			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

********** -- Modified section -- **********

9.5.3 UE Privacy Options

The UE privacy options in the SLPP apply to an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR and either indicate that no CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR is allowed for the UE (except as may be overridden by the POI or local regulatory requirements) or define the particular classes of LCS client for which an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR for location are allowed, with the following classes being possible:

[Editor's note: An e-mail comment pointed out that there are different cases still to be covered in the description of the classes: 1. the LCS Client identity is included in SLPP or 2. the LCS Client identity is NOT included in SLPP. Also some GMLC restriction conditions need to be mentioned.]

a) Universal Class - allow positioning by all LCS clients;

b) Call/Session related Class

c) Call/Session-unrelated Class

d) PLMN operator Class

Moreover the SLPP may contain the service types allowed by the subscriber.
All UE privacy options of above four classes are commonly used for both CS and PS domain.
Note 1: If a privacy option setting in a domain is updated, the same modification will be applied to the other domain.

Note 2: The options for each privacy class and the service type are described in the subsequent chapters independently from the options of the other privacy classes. The combination of the privacy class and service type options are described in the rules of Annex A

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Tdoc ⌘SA2-023030
~~(Revised S2-022971)~~

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **109** ⌘**rev** **1** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Privacy class selection rule
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	17/10/2002
Category:	⌘	**A**
Release:	⌘	Rel-5

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

Use one of the following releases:

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

Reason for change:	⌘	The text of the call/session related/unrelated and service type privacy is not inline with the diagram in annex A
Summary of change:	⌘	The text is adapted to the diagram in annex A
Consequences if not approved:	⌘	The ambiguity between text and the diagram remains for the call/session related/unrelated and service type privacy

Clauses affected:	⌘	Section 9.5.3			
		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 -- **********

9.5.3 UE Privacy Options

The UE privacy options in the SLPP apply to an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR and either indicate that no CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR is allowed for the UE (except as may be overridden by the POI or local regulatory requirements) or define the particular classes of LCS client for which an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR for location are allowed, with the following classes being possible:

[Editor's note: An e-mail comment pointed out that there are different cases still to be covered in the description of the classes: 1. the LCS Client identity is included in SLPP or 2. the LCS Client identity is NOT included in SLPP. Also some GMLC restriction conditions need to be mentioned.]

a) Universal Class - allow positioning by all LCS clients;

b) Call/Session related Class

c) Call/Session-unrelated Class

d) PLMN operator Class

Moreover the SLPP may contain the service types allowed by the subscriber.
All UE privacy options of above four classes are commonly used for both CS and PS domain.
If more than one privacy class are subscribed, privacy class for an MT-LR is selected according to the rule described in the ANNEX A. ANNEX A applies also in case service types privacy checking are subscribed together with one or more other privacy classes.
Note 1: If a privacy option setting in a domain is updated, the same modification will be applied to the other domain.

Note 2: The options for each privacy class and the service type are described in the subsequent chapters independently from the options of the other privacy classes. The combination of the privacy class and service type options are described in the rules of Annex A

3GPP TSG-SA2 Meeting #27
Beijing, China, October 14 – 18, 2002

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CHANGE REQUEST

⌘ **23.271** **CR** **108** ⌘**rev** **1** ⌘ Current version: **4.7.0** ⌘

*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:	⌘	Privacy class selection rule
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	17/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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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 text of the call/session related/unrelated privacy is not inline with the diagram in annex A
Summary of change:	⌘	The text is adapted to the diagram in annex A
Consequences if not approved:	⌘	The ambiguity between text and the diagram remains for the call/session related/unrelated privacy

Clauses affected:	⌘	Section 9.5.3			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

********** -- Modified section -- **********

9.5.3 UE Privacy Options

The UE privacy options in the SLPP apply to an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR and either indicate that no CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR is allowed for the UE (except as may be overridden by the POI or local regulatory requirements) or define the particular classes of LCS client for which an CS-MT-LR/PS-MT-LR or NI-LR/PS-NI-LR for location are allowed, with the following classes being possible:

[Editor's note: An e-mail comment pointed out that there are different cases still to be covered in the description of the classes: 1. the LCS Client identity is included in SLPP or 2. the LCS Client identity is NOT included in SLPP. Also some GMLC restriction conditions need to be mentioned.]

a) Universal Class - allow positioning by all LCS clients;

b) Call/Session related Class

c) Call/Session-unrelated Class

d) PLMN operator Class

All UE privacy options of above four classes are commonly used for both CS and PS domain.
The privacy classes are selected according to the rules described in the ANNEX A. If more than one privacy class are subscribed in the UE's SLPP, the looser privacy setting shall be selected.

Note 1: If a privacy option setting in a domain is updated, the same modification will be applied to the other domain.

Note 2: The options for each privacy class are described in the subsequent chapters independently from the options of the other privacy classes. The combination of the privacy class options are described in the rules of Annex A

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Beijing, China, October 14-18, 2002

Tdoc ⌘ S2-022028

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **126** ⌘ **rev** **1** ⌘ Current version: **6.1.0** ⌘

*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:	⌘	Corrections to inter GMLC interface procedure
Source:	⌘	Nokia
Work item code:	⌘	LCS
Date:	⌘	09.10.2002
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The description of the periodic location request should be clarified.
Summary of change:	⌘	Periodicity control is done in R-GMLC.
Consequences if not approved:	⌘	There would exist some unclear issues in TS 23.271.

Clauses affected:	⌘				
		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 >>

9.1.1 MT-LR routing procedure in PS and CS domain

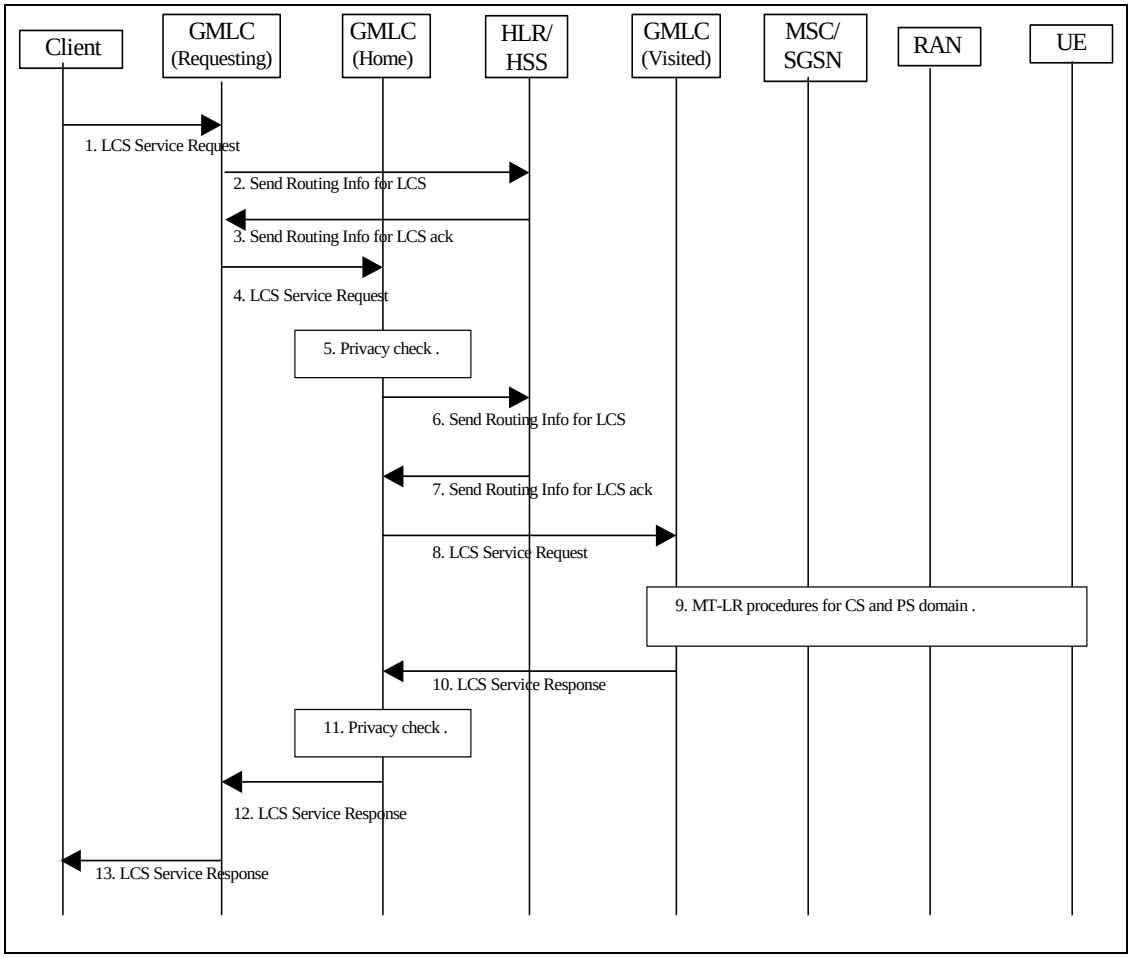

Figure 9.1: General Network Positioning for a MT-LR

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 R-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 R-GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. 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. 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.

~~The LCS service request may also contain the type of the Requestor identity if the requestor identity was included.~~

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~~, or if periodic location is requested~~, the steps following below may be repeated.

Editor's note: This ~~would~~ means that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain. ~~It is for further study should H-GMLC handle the periodicity of location requests.~~

2) 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. If the R-GMLC supports the Lr interface, the R-GMLC capability information shall be included in the SEND_ROUTING_INFO_FOR_LCS message.
If the R-GMLC already knows, or is able to determine, the network address of H-GMLC of the target UE, (e.g. from a previous location request), then step 2 and step 3 may be skipped. One possibility could be to use a DNS lookup to determine the H-GMLC address, but this is FFS.

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.

3) The HLR/HSS verifies the R-GMLC's network address. The HLR/HSS may return the address of the PPR to the GMLC if available. The HLR/HSS then compares the R-GMLC address with the H-GMLC network address for the target UE. The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned. The HLR/HSS returns the address of the H-GMLC.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
The R-GMLC sends the location request to the H-GMLC.

5) The H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. 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 and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client.

~~If periodic location is requested, this step and the steps following below may be repeated.~~

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. 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 was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return 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.

8) The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).
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 forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR,

and the IMSI and MSISDN for the target UE. The forwarded 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~~X~~). The V-GMLC first authenticates that the location request is allowed from this PLMN or from this country. If not, an error response is returned.
In the cases when the H-GMLC did not receive the address of the V-GMLC, when the V-GMLC address is the same with the H-GMLC address or when both PLMN operators agree not to use Lr interface, the H-GMLC does not forward the location request to the V-GMLC and step 10 is skipped.

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 ~~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 (e.g.~~ex~~. UE 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).

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

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check.

12) The H-GMLC sends the location service response to the R-GMLC.

13) 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 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.

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Beijing, China, October 14-18, 2002

Tdoc ⌘ S2-023027

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CHANGE REQUEST

⌘ **23.271** **CR** **125** ⌘ **rev** **1** ⌘ Current version: **6.1.0** ⌘

*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:	⌘	Correction to privacy check procedure
Source:	⌘	Nokia
Work item code:	⌘	LCS
Date:	⌘	07.10.2002
Category:	⌘	**C**
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:	⌘	HLR/HSS shall send the corresponding VMSC/SGSN address and V-GMLC address if available to the R-GMLC in the Send-Routing-Info-for-LCS response. The text describing the privacy check performed in the PPR was added to a wrong step in 9.1.1.
Summary of change:	⌘	HLR/HSS sends VMSC/SGSN and V-GMLC address to the R-GMLC. Text about privacy check in PPR is moved from step 8 to step 5 in 9.1.1.
Consequences if not approved:	⌘	HLR/HSS can not sends VMSC/SGSN and V-GMLC address address to the R-GMLC. Misfunction in the sequence flow on privacy check.

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

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

<< First changed clause >>

9.1.1 MT-LR routing procedure in PS and CS domain

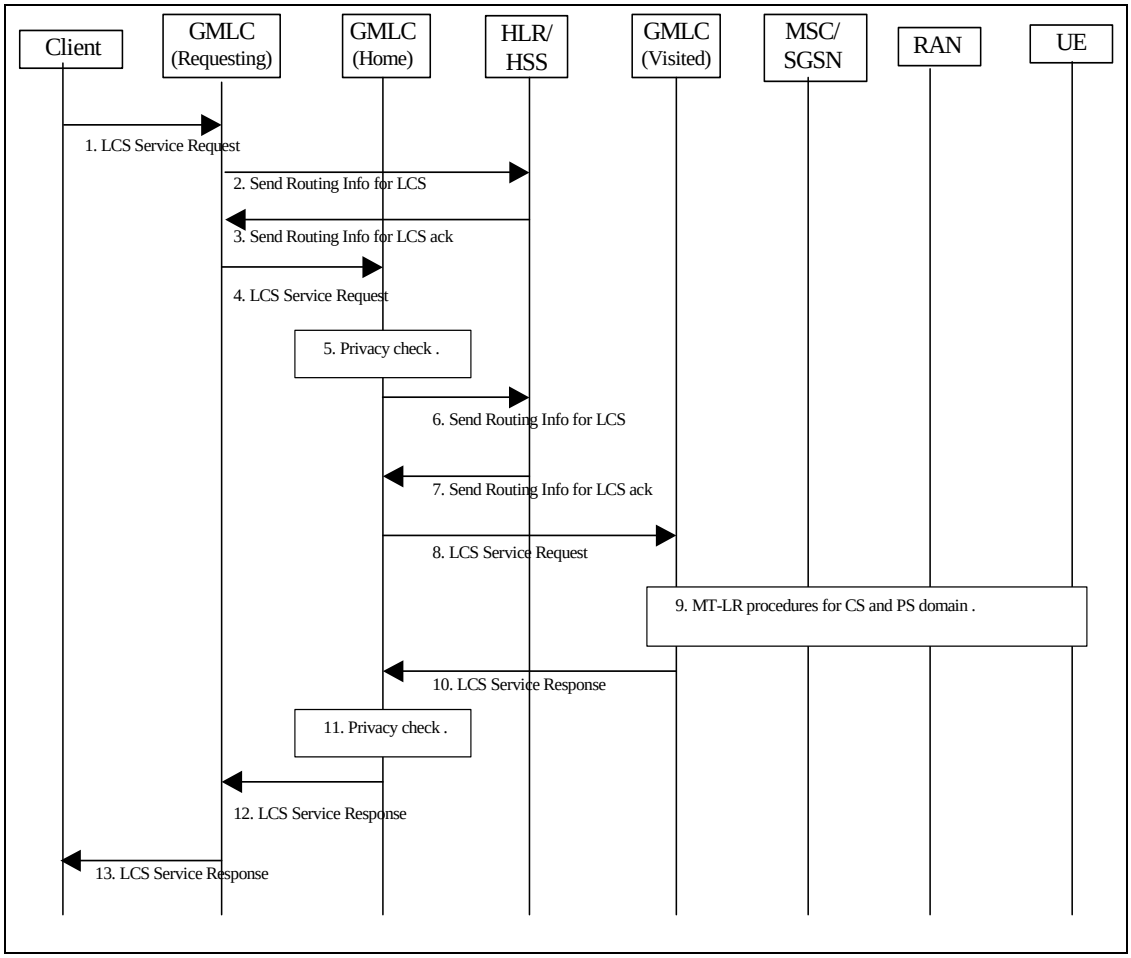


Figure 9.1: General Network Positioning for a MT-LR

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 R-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 R-GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. 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. 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.

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.

Editor's note: This would mean that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain. It is for further study should H-GMLC handle the periodicity of location requests.

2) 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. If the R-GMLC supports the Lr interface, the R-GMLC capability information shall be included in the SEND_ROUTING_INFO_FOR_LCS message.
If the R-GMLC already knows, or is able to determine, the network address of H-GMLC of the target UE, (e.g. from a previous location request), then step 2 and step 3 may be skipped. One possibility could be to use a DNS lookup to determine the H-GMLC address, but this is FFS.

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.

3) The HLR/HSS verifies the R-GMLC's network address. The HLR/HSS may return the address of the PPR to the GMLC if available. The HLR/HSS then compares the R-GMLC address with the H-GMLC network address for the target UE. The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned. The HLR/HSS returns the address of the H-GMLC. The HLR/HSS also returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server. The HLR/HSS may also return the address of the V-GMLC, if available.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
The R-GMLC sends the location request to the H-GMLC.

5) The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN) if available. The H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. 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 and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client.

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. 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 was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return 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.

8) ~~The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).~~ If step 6 and step 7 were performed, the H-GMLC/PPR may do a new privacy check.
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 forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN for the target UE. The forwarded 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 X). The V-GMLC first authenticates that the location request is allowed from this PLMN or from this country. If not, an error response is returned.
In the cases when the H-GMLC did not receive the address of the V-GMLC, when the V-GMLC address is the same with the H-GMLC address or when both PLMN operators agree not to use Lr interface, the H-GMLC does not forward the location request to the V-GMLC and step 10 is skipped.

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 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. UE 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).

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

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check or the GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1.
.

12) The H-GMLC sends the location service response to the R-GMLC.

13) 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 GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.

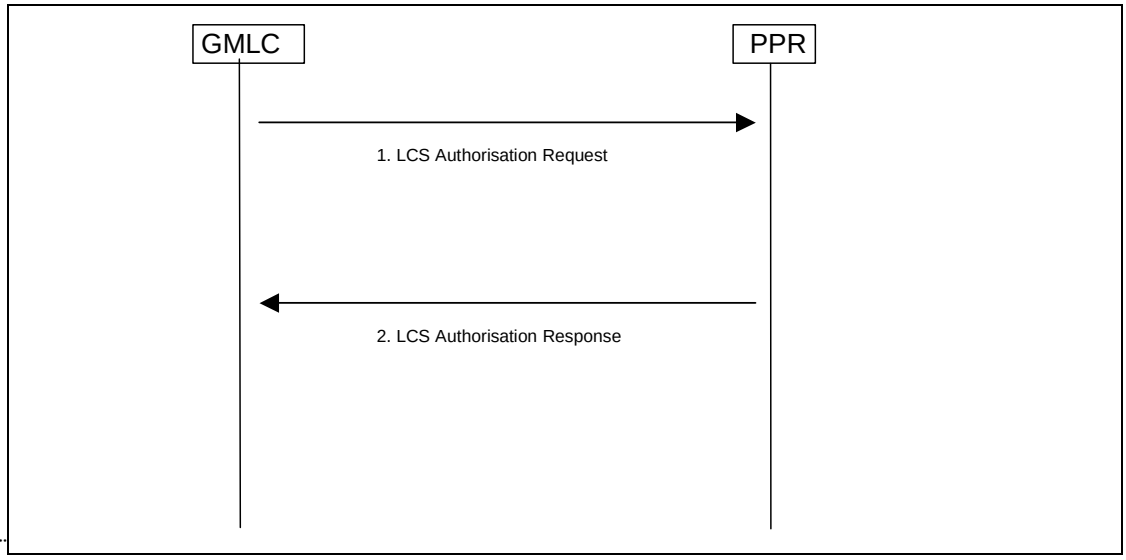
The detailed CS-MT-LR and PS-MT-LR procedures in step 4 of figure 9.1 are described in 9.1.2 and 9.1.6.

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

<< Next Changed clause >>

9.1.1.1 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.



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 IMSI and indication whether the request is call/session related or call/session unrelated. 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 check 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 call/session unrelated privacy check in PPR. 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). 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) PPR performs the privacy check based on the target UE's privacy profile. The result of that privacy check is send 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 is an additional privacy check needed when the GMLC has received the location information of the target UE (e.g. if target UE allows its location information to LCS clients when it is located in certain areas).

   ~~In case subscriber want's to be located in visited networks which have certain capabilities, then this information is also included 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 in to a pseudo external ID which shall carry the response of the privacy check. 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.

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CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **122** ⌘**rev** **1** ⌘ Current version: **6.1.0** ⌘

*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:	⌘	Codeword handling mechanism for Rel-6.
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS2-GMLC
Date:	⌘	16/10/2002
Category:	⌘	**C**
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:	⌘	Codeword handling mechanism for Rel-5 is changed.
Summary of change:	⌘	Codeword handling mechanism for Rel-6 is modified according to the changes for Rel-5.
Consequences if not approved:	⌘	Rel-6 codeword mechanism is not in line with the Rel-5 mechanism.

Clauses affected:	⌘	9.1.1, 9.1.2.1, 9.1.6.1			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘	This CR corresponds to Rel-5 CR (CR121r1, S2-023024)			

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

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

9.1.1 MT-LR routing procedure in PS and CS domain

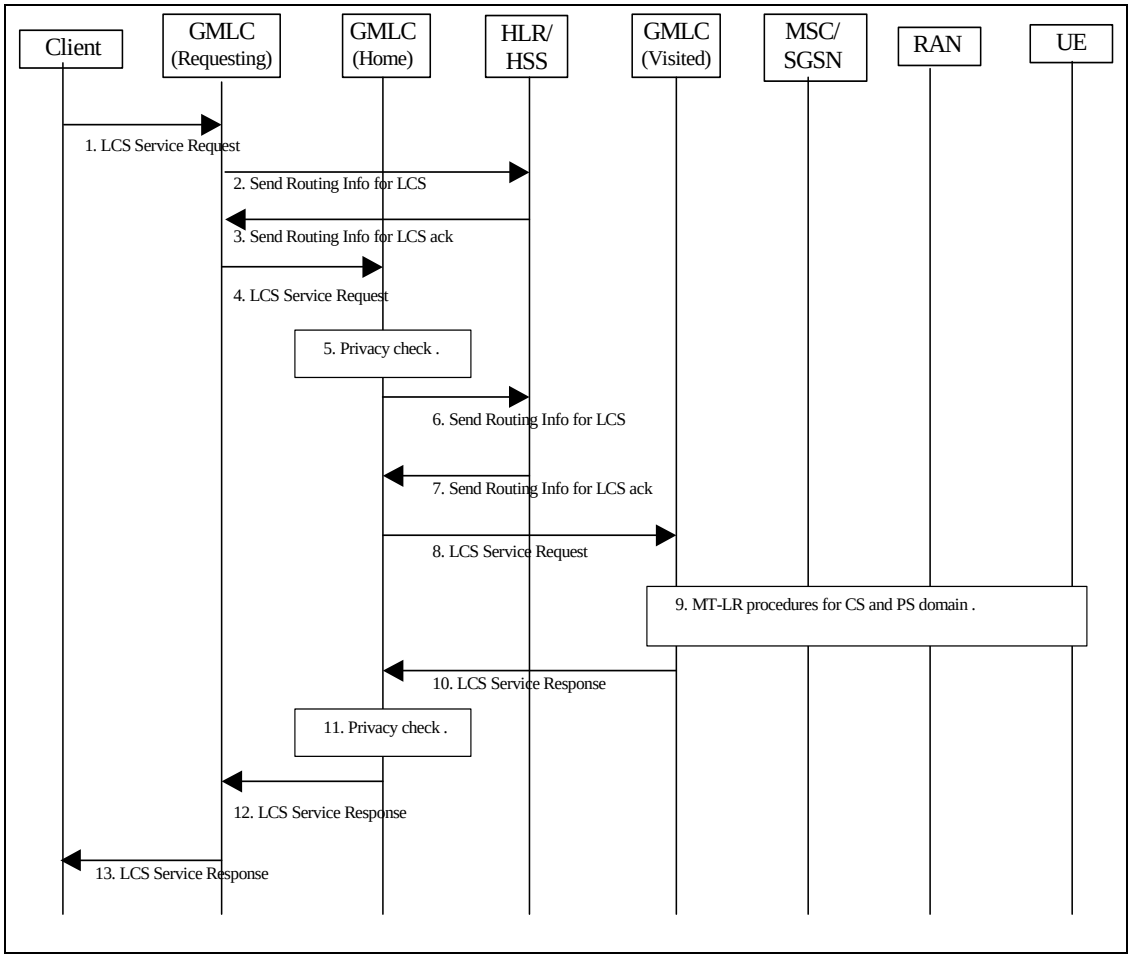

Figure 9.1: General Network Positioning for a MT-LR

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 R-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 R-GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. 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. 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.

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.

Editor's note: This would mean that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain. It is for further study should H-GMLC handle the periodicity of location requests.

2) 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. If the R-GMLC supports the Lr interface, the R-GMLC capability information shall be included in the SEND_ROUTING_INFO_FOR_LCS message.
If the R-GMLC already knows, or is able to determine, the network address of H-GMLC of the target UE, (e.g. from a previous location request), then step 2 and step 3 may be skipped. One possibility could be to use a DNS lookup to determine the H-GMLC address, but this is FFS.

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.

3) The HLR/HSS verifies the R-GMLC's network address. The HLR/HSS may return the address of the PPR to the GMLC if available. The HLR/HSS then compares the R-GMLC address with the H-GMLC network address for the target UE. The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned. The HLR/HSS returns the address of the H-GMLC.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
If the R-GMLC received the address of the H-GMLC, t~~T~~he R-GMLC sends the location request to the H-GMLC.
If the R-GMLC did not receive the H-GMLC address and can not retrieve the H-GMLC address by 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.

5) The H-GMLC verifies the R-GMLC's network address in order to check whether the R-GMLC is authorized to request UE location information. If the R-GMLC is not authorized, an error response is returned. Otherwise, ~~T~~the H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. 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 and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client.

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. 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 was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return 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.

8) The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).
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 forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN for the target UE. The forwarded 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 X). The V-GMLC first authenticates that the location request is allowed from this PLMN or from this country. If not, an error response is returned.

In the cases when the H-GMLC did not receive the address of the V-GMLC, when the V-GMLC address is the same with the H-GMLC address or when both PLMN operators agree not to use Lr interface, the H-GMLC does not forward the location request to the V-GMLC and step 10 is skipped.

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 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. UE 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).

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

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check.

12) The H-GMLC sends the location service response to the R-GMLC.

13) 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 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 Change >>

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 ~~HLR/HSS~~ 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. The message also shall carry the indication of the requested privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) in the MSC, which is provided by H-GMLC.

3) If the GMLC is located in another PLMN or another country, the VMSC/MSC server first authenticates that a location request is allowed from this PLMN or from this country. If not, an error response is returned. If the PSL message from the GMLC does not include the indication of the requested privacy related action, the VMSC/MSC server then verifies LCS barring restrictions in the UE user's subscription profile in the MSC server. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is

barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC.
Otherwise, if the UE is in idle mode, the Core Network performs paging, authentication and ciphering. The MSC will page a GPRS attached UE either through A/Iu or Gs interface, depending on the presence of the Gs interface (see Note).The UE will inform the network about its LCS capabilities, as described in chapter 6.3.4.. If the UE is instead in dedicated mode, the VMSC/MSC server will already have UE classmark information. In GSM this is supported by controlled early classmark sending.

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

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

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

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

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

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

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

<< Next Change >>

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 ~~HLR/HSS~~ 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. 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.

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Beijing, China, 14th – 18th October 2002

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CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **121** ⌘**rev** **1** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Correction of codeword handling mechanism.
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	16/10/2002
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:	⌘	In the current specification, the codeword handling information is stored and checked at HLR/HSS. If the GMLC does not indicate "codeword is not applicable" and the codeword handling information indicates "the codeword shall be checked in network" the HLR/HSS rejects the location request. However, if the location request is come from an emergency service provider HLR/HSS shall not reject the location request. Therefore HLR/HSS is not good place to check the codeword handling information.
Summary of change:	⌘	Codeword handling mechanism is corrected. All codeword related information is stored in GMLC. HLR/HSS does not check the codeword handling information, and does not reject the location request.
Consequences if not approved:	⌘	Emergency service can not get the UE user's location when the UE user wanted to be protected by codeword mechanism.

Clauses affected:	⌘	9.1.1, 9.1.2.1, 9.1.6.1, 10.1.1, 10.3.2

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications		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.

9.1.1 MT-LR routing procedure in PS and CS domain

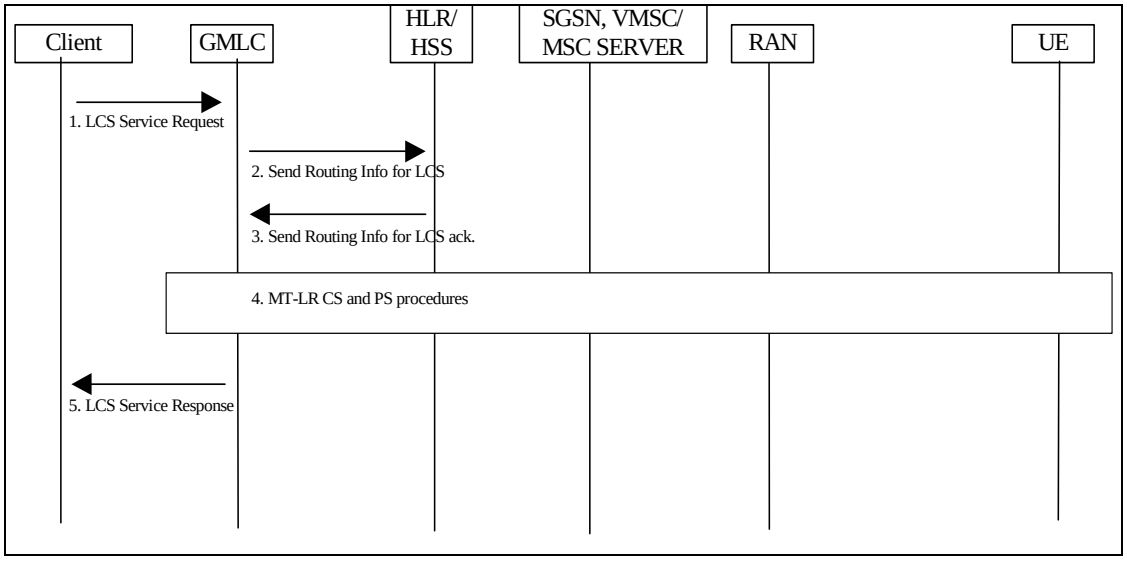

Figure 9.1: General Network Positioning for a MT-LR

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 ~~If the GMLC holds the list of Codewords for the target UE,~~ 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~~s~~ the list of Codewords for the target UE or ~~and~~ 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), ~~and the list of codeword for the target UE is stored in the GMLC,~~ 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. ~~When a LCS client type is different from "value added" or the GMLC stores the list of codeword for the target UE, an indication may be sent to the HLR/HSS, in order to inform the HLR/HSS that the codeword is not applicable.~~

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 MS's capabilities for LCS. Other priority criteria are for further study.

~~If the GMLC did not inform the HLR/HSS that the codeword is not applicable, the HLR/HSS checks whether the target UE user wants to be protected by codeword mechanism or not. If the target UE user wants to be protected by the codeword mechanism and wants that the codeword shall be sent to the UE, then the HLR/HSS shall send to the GMLC the related indication in SEND_ROUTING_INFO_FOR_LCS_ack message. If the target UE user wants to be protected by the codeword mechanism and wants that the codeword shall be checked in the network, then the HLR/HSS shall return an error message to the GMLC. If the target UE user does not want to be protected by the codeword mechanism, the request shall not be rejected by the HLR/HSS.~~
~~If the HLR/HSS receives the indication from the GMLC that the codeword is not applicable, the request shall not be rejected by the HLR/HSS.~~

Moreover, if the HLR/HSS supports the Rel-5 Enhanced User Privacy, the HLR/HSS shall check if the VMSC and/or the SGSN under which the target subscriber is located supports the Rel-5 Enhanced User Privacy mechanisms, by checking the supported LCS capabilities set. Only the address of a serving node that supports the Rel-5 Enhanced User Privacy mechanism will be returned to GMLC. If none of the VMSC or SGSN supports the Rel-5 Enhanced User Privacy, then the HLR/HSS may send an error indication to the GMLC.

NOTE: This handling allows the HPLMN to reject LCS requests when the VPLMN which the target subscriber is located does not support the Rel-5 Enhanced User Privacy mechanisms, in order to fully protect the user privacy.

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 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 Change >>

9.1.2.1 Location Preparation Procedure

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

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

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

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

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

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

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

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

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

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

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

<< Next Change >>

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 HLR/HSS indicated~~ 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.

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 Change >>

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

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

~~The HLR/HSS may store information of codeword handling given by the UE subscriber.~~

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

Table 10.1: Logical States for each LCS Privacy Class

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

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

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

LCS Privacy Class	Status	Additional HLR Data when Class is provisioned
Universal Class	-	No additional data
Call/session Related Class	M	Indication of one of the following mutually exclusive options for any LCS client not in the external LCS client list: • Location not allowed • Location allowed without notification (default case) • Location allowed with notification • Location with notification and privacy verification; location allowed if no response • Location with notification and privacy verification; location restricted if no response
	O 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 10.3: LCS Service types stored in the HLR/HSS per UE subscriber

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

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

Table 10.4: Logical States for each Mobile Originating LCS Class

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

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

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

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

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

Table 10.6a: Temporary LCS data in the HLR

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

~~**Table 10.6b: Codeword handling information stored in the HLR**~~

~~Other Data in the HLR~~	~~Status~~	~~Description~~
~~Codeword handling information~~	~~O~~	~~Indication of one of the following mutually exclusive options for codeword:~~ ~~- codeword check is not required~~ ~~- codeword shall be checked in network.~~ ~~- codeword shall be sent to UE~~

<< Next Change >>

10.3.2 LCS Data in the GMLC for a UE Subscriber

GMLC may store a codeword handling information and a list of Codewords given by the UE subscriber~~, to be provided by the LCS client~~ in order not to get the location request rejected.

Table 10.8a: Codeword handling information stored in the GMLC

Other Data in the GMLC	Status	Description
Codeword handling information	O	Indication of one of the following mutually exclusive options for codeword: • codeword shall be checked in network. • codeword shall be sent to UE

Table 10.8b: ~~LCS data~~Codeword list stored in the GMLC for a UE Subscriber

LCS Privacy profile	Status	Additional GMLC data when profile is provisioned
Codeword	O	A list of codeword.

If the GMLC stores the codeword handling information and/or the codeword list for the target UE, the restriction on the GMLC in SLPP shall be set as "Identified GMLCs only", and only the GMLC that stores the codeword related information shall be included in the GMLC list stored in HLR/HSS.

3GPP TSG SA WG2 Meeting #27 **S2-022962**
Beijing, China, 14th – 18th October 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** 134 ⌘**rev** **-** ⌘ Current version: **6.1.0** ⌘

*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:	⌘	Addtion of reference number to deferred MT-LR procedure
Source:	⌘	NTT DoCoMo, NEC
Work item code:	⌘	LCS1
Date:	⌘	14/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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Detailed explanations of the above categories can be found in 3GPP TR 21.900.

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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:	⌘	LS from CN4 (S2-022795) decsribes as follows. *MAP_PROVIDE_SUBSCRIBER_LOCATION message to MAP_SUBSCRIBER_LOCATION_REPORT message in the current stage 3 specification. During the discussion, it was recognized that addition of reference number to the messages is needed so that the network can identify the correspondence of two messages. CN4 asks SA2 to decide which node (i.e. MSC/SGSN, GMLC or LCS client) assigns the reference number.* Therefore, addtion of reference number is needed to deferred MT-LR procedure.
Summary of change:	⌘	The reference number that is assigned by GMLC is added to the deferred MT-LR procedure.
Consequences if not approved:	⌘	The specification cannot guarantee the GMLC to send the response to the corresponding request when the GMLC receives two or more deferred MT-LR for the same UE from the LCS client.

Clauses affected:	⌘	9.1.8.1, 9.1.8.2, 9.1.8.3, 9.1.8.4

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications		TS29.002
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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

9.1.8.1 Deferred Location Request Procedure

1) GMLC assigns a reference number to Provide Subscriber Location. Provide Subscriber Location is received in SGSN/MSC as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number and the event that shall trigger the sending of Location Report.

Note: The GMLC shall send the Provide Subscriber Location for the UE regardless of the ongoing previous MT-LR for the same UE.

2) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned in step 3 with a suitable cause. The SGSN/MSC verifies that the LCS client is allowed to position the requested UE according to subscription information (no interaction at this stage with the UE). If not, a Provide Subscriber Location return error is returned in step 3.

3) If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks in step 2 are satisfied, a Provide Subscriber Location ack. shall be returned to the GMLC without a location estimate.

4) The GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not.

9.1.8.2 Location Report Procedure

5) 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 adress of the new SGSN/MSC is included in Subscriber Location Report if available. (If new SGSN/MSC adress was included, the GMLC continues at step 1 above, otherwise it continues with an interrogation against HLR as described in 9.1.1.)

6) 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 checks fails, a Subscriber Location Report with the reference number that was included in the Provide Subscriber Location is returned with appropriate error cause indicating termination of the deferred location request.

7) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. ~~Included in the~~ The report ~~is~~ 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.

8) GMLC then returns the LCS Service Response to the LCS Client as in 9.1.2/9.1.6.

9.1.8.3 Combined Periodical/Deferred Mobile Terminating Location Request

Figure 9.6b illustrates the procedures for a Combined Periodical/Deferred Mobile Terminating Location Request, where the response to the LCS client is returned periodically and based on the event.

Note: In the current specification, it is assumed the LCS client issues the Periodical/Deferred MT-LR with only the location estimate type of “current location”.

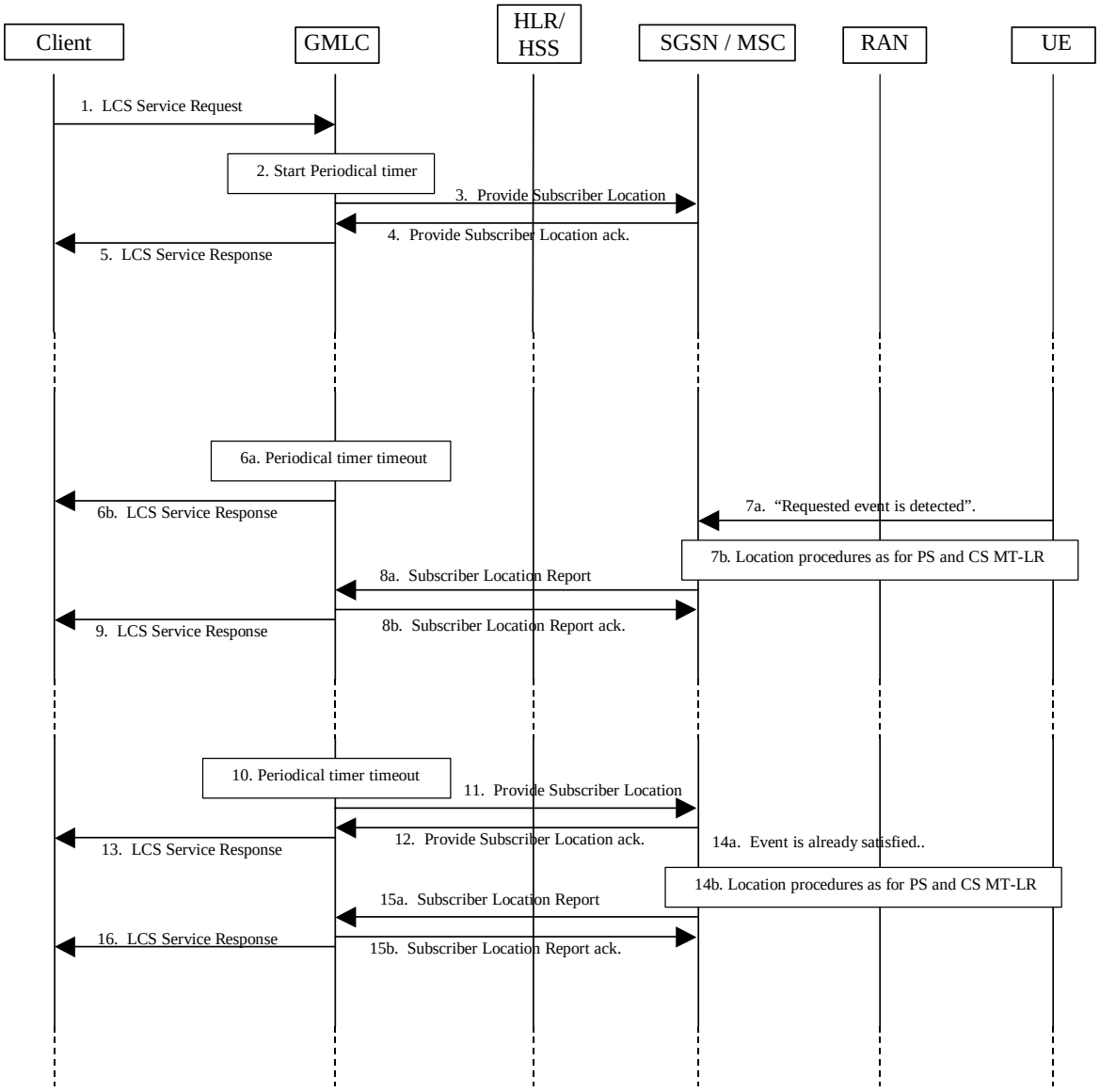

Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

1) When a GMLC receives a LCS Service Request from a LCS client, the GMLC verifies the identity of the LCS client as described in 9.1.1.

2) The GMLC starts the periodical timer, sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and gets SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. 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), the Send Routing Info is not sent to the HLR/HSS.

3) The GMLC sends a Deferred Location Request to the SGSN/MSC by means of Provide Subscriber Location as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number assigned by the GMLC and the event that shall trigger the sending of Subscriber Location Report.

4) If the SGSN/MSC cannot support the deferred location request for the specified event or the LCS client is not allowed to position the requested UE according to subscription information, a Provide Subscriber Location error is returned to the GMLC. If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks are satisfied, a Provide Subscriber Location ack shall be returned to the GMLC without a location estimate.

5) The GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not.

6) When the periodical timer expires, if the GMLC is still waiting for the event, the GMLC shall send a LCS Service Response to the LCS client, indicating that the location is not available at that moment.

7) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

8) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall include~~s~~ the reference number included in the previously sent Provide Subscriber Location and an indication that this is a response to a previously sent deferred location request.

If the location information could not be obtained, or the SGSN/MSC for some other reason decides to not wait any longer for the requested event to occur (ex. timer expires), the Subscriber Location Report with the reference number included in the previously sent Provide Subscriber Location will be returned with an appropriate error cause indicating termination of the deferred location request.

9) GMLC then returns the LCS Service Response to the LCS Client as in 9.1.2/9.1.6.

10) When the timer expires, if the GMLC is not waiting for the event, the GMLC sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and receives SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. 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), the Send Routing Info is not sent to the HLR/HSS.

11) Same as step 3.

12) Same as step 4.

13) Same as step 5.

14) If the requested event is already satisfied, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

15) Same as step 8.

16) Same as step 9.

9.1.8.4 Cancellation of a Deferred Location Request

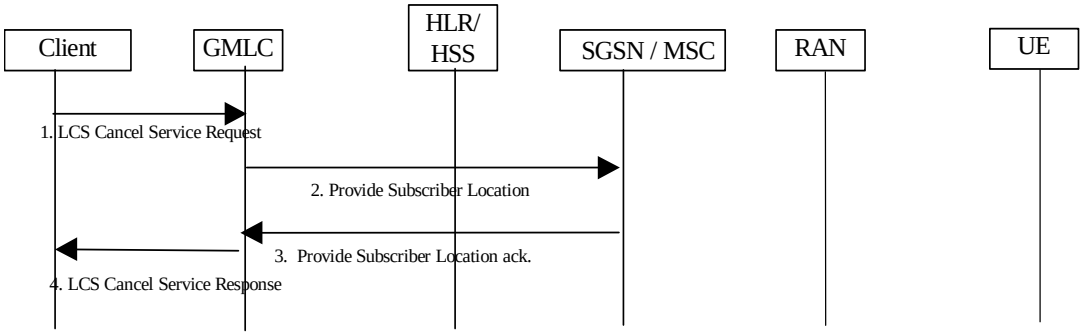

Figure 9.6c: Cancellation of a Deferred MT-LR procedure

1) The LCS Client requests the cancellation of a previously requested Deferred Location Request. The cancellation could be initiated by the GMLC itself for some reasons (e.g. implementation dependent timer in the GMLC expired). If the UE's privacy profile stored in the H-GMLC or in the PPR was changed, any outstanding Deferred Location Request, which would not have been authorized with the new profile, shall be cancelled or the requested action for the VPLMN shall be changed. The H-GMLC initiates the cancellation and may send a new Deferred Location Request to the VPLMN. The event type to cancel must be indicated in the Cancellation procedure.

If the previously requested Deferred Location Request was forwarded to other GMLC (H-GMLC or V-GMLC), the cancellation request from the LCS client shall be forwarded to the other GMLC.

Note: The GMLC shall know that the UE subscribers privacy profile has been changed in the PPR when the LCS Privacy Profile Update has been send from PPR to GMLC as described in 9.1.1.2.

2) The GMLC will indicate this cancellation request in the Provide Subscriber Location toward the SGSN/MSC. The Provide Subscriber Location shall include the reference number that was included in the previously sent Provide Subscriber Location.

3) When the SGSN/MSC completes the cancellation procedure, it notifies it to the GMLC in the Provide Subscriber Location Ack (with no location estimate included).

   If the cancellation request was forwarded to other GMLC (H-GMLC or V-GMLC), the GMLC (H-GMLC or V-GMLC) informs the GMLC (R-GMLC or H-GMLC) that the cancellation procedure has been successfully completed.

4) The GMLC informs the LCS Client that the cancellation procedure has been successfully completed.

3GPP TSG SA WG2 Meeting #27 **S2-022961**
Beijing, China, 14th – 18th October 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** 133 ⌘**rev** **-** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Addtion of reference number to deferred MT-LR procedure
Source:	⌘	NTT DoCoMo, NEC
Work item code:	⌘	LCS1
Date:	⌘	14/10/2002
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:	⌘	LS from CN4 (S2-022795) decsribes as follows. *MAP_PROVIDE_SUBSCRIBER_LOCATION message to MAP_SUBSCRIBER_LOCATION_REPORT message in the current stage 3 specification. During the discussion, it was recognized that addition of reference number to the messages is needed so that the network can identify the correspondence of two messages. CN4 asks SA2 to decide which node (i.e. MSC/SGSN, GMLC or LCS client) assigns the reference number.* Therefore, addtion of reference number is needed to deferred MT-LR procedure. Addtion of the optional procedure that the SGSN/MSC may reject identical repeated deferred location requests for the same UE was agreed at the SA2#27 meeting. However, this is not essential correction and it affect the frozen stage3 specifioncation. Therefore, it shoud be cancelled.
Summary of change:	⌘	The reference number that is assigned by GMLC is added to the deferred MT-LR procedure. The procedure that that the SGSN/MSC may reject identical repeated deferred location requests for the same is deleted from the deferred MT-LR procedure
Consequences if not approved:	⌘	The specification cannot guarantee the GMLC to send the response to the corresponding request when the GMLC receives two or more deferred MT-LR for the same UE from the LCS client.

Clauses affected:	⌘	9.1.8.1, 9.1.8.2, 9.1.8.3, 9.1.8.4			
Other specs	⌘	Y: ☒ N: ☐	Other core specifications	⌘	TS29.002

affected:	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 modifed Section>>

9.1.8.1 Deferred Location Request Procedure

1) GMLC assigns a reference number to Provide Subscriber Location. Provide Subscriber Location is received in SGSN/MSC as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number and the event that shall trigger the sending of Location Report.

Note: The GMLC shall send the Provide Subscriber Location for the UE regardless of the ongoing previous MT-LR for the same UE.

2) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned in step 3 with a suitable cause. ~~The SGSN/MSC may reject identical repeated deferred location requests for the same UE.~~ The SGSN/MSC verifies that the LCS client is allowed to position the requested UE according to subscription information (no interaction at this stage with the UE). If not, a Provide Subscriber Location return error is returned in step 3.

3) If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks in step 2 are satisfied, a Provide Subscriber Location ack. shall be returned to the GMLC without a location estimate.

4) The GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not.

9.1.8.2 Location Report Procedure

5) 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 adress of the new SGSN/MSC is included in Subscriber Location Report if available. (If new SGSN/MSC adress was included, the GMLC continues at step 1 above, otherwise it continues with an interrogation against HLR as described in 9.1.1.)

6) 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 checks fails, a Subscriber Location Report with the reference number that was included in the Provide Subscriber Location is returned with appropriate error cause indicating termination of the deferred location request.

7) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. ~~Included in T~~the report ~~is~~ shall include 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.

8) GMLC then returns the LCS Service Response to the LCS Client as in 9.1.2/9.1.6.

9.1.8.3 Combined Periodical/Deferred Mobile Terminating Location Request

Figure 9.6b illustrates the procedures for a Combined Periodical/Deferred Mobile Terminating Location Request, where the response to the LCS client is returned periodically and based on the event.

Note: In the current specification, it is assumed the LCS client issues the Periodical/Deferred MT-LR with only the location estimate type of “current location”.

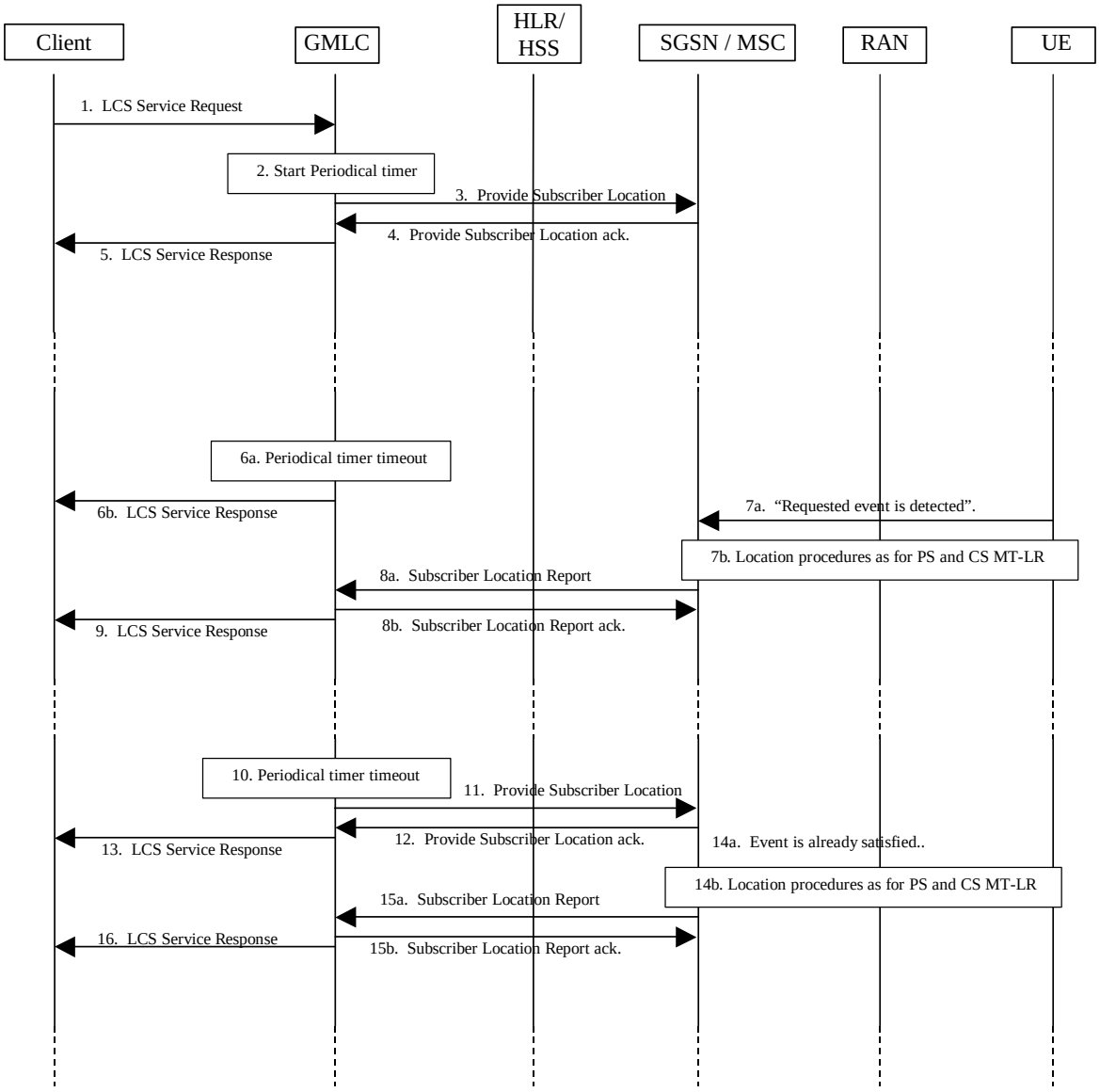

Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

1) When a GMLC receives a LCS Service Request from a LCS client, the GMLC verifies the identity of the LCS client as described in 9.1.1.

2) The GMLC starts the periodical timer, sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and gets SGSN/MSC addresses from the HLR/HSS as described in 9.1.1.

3) The GMLC sends a Deferred Location Request to the SGSN/MSC by means of Provide Subscriber Location as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number assigned by the GMLC and the event that shall trigger the sending of Subscriber Location Report.

Note: The GMLC shall send the Provide Subscriber Location for the UE regardless of the ongoing previous MT-LR for the same UE

4) If the SGSN/MSC cannot support the deferred location request for the specified event or the LCS client is not allowed to position the requested UE according to subscription information, a Provide Subscriber Location error is returned to the GMLC. ~~The SGSN/MSC may reject identical repeated deferred location requests for the same UE.~~ If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks are satisfied, a Provide Subscriber Location ack shall be returned to the GMLC without a location estimate.

5) The GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not.

6) When the periodical timer expires, if the GMLC is still waiting for the event, the GMLC shall send a LCS Service Response to the LCS client, indicating that the location is not available at that moment.

7) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

8) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall include~~s~~ the reference number included in the previously sent Provide Subscriber Location and an indication that this is a response to a previously sent deferred location request.

If the location information could not be obtained, or the SGSN/MSC for some other reason decides to not wait any longer for the requested event to occur (ex. timer expires), the Subscriber Location Report with the reference number included in the previously sent Provide Subscriber Location will be returned with an appropriate error cause indicating termination of the deferred location request.

9) GMLC then returns the LCS Service Response to the LCS Client as in 9.1.2/9.1.6.

10) When the timer expires, if the GMLC is not waiting for the event, the GMLC sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and receives SGSN/MSC addresses from the HLR/HSS as described in 9.1.1.

11) Same as step 3.

12) Same as step 4.

13) Same as step 5.

14) If the requested event is already satisfied, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

15) Same as step 8.

16) Same as step 9.

9.1.8.4 Cancellation of a Deferred Location Request

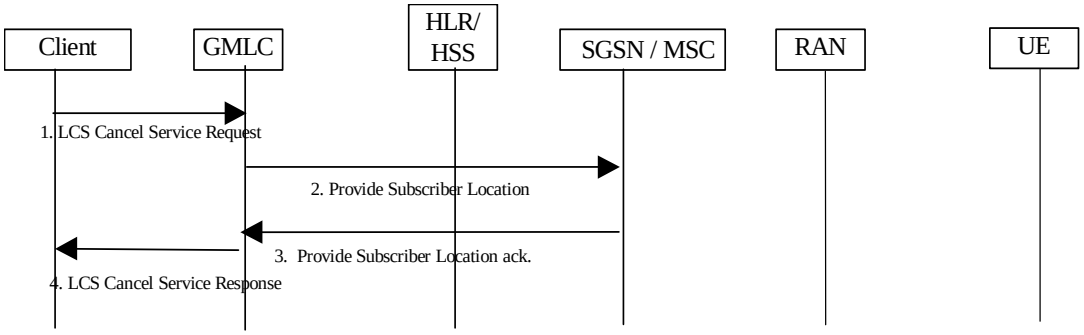

Figure 9.6c: Cancellation of a Deferred MT-LR procedure

1) The LCS Client requests the cancellation of a previously requested Deferred Location Request. The cancellation could be initiated by the GMLC itself for some reasons (e.g. implementation dependent timer in the GMLC expired, or the UE's Codeword stored in the GMLC was changed and the Deferred Location Request is not allowed any more.). The event type to cancel must be indicated in the Cancellation procedure.

2) The GMLC will indicate this cancellation request in the Provide Subscriber Location toward the SGSN/MSC. The Provide Subscriber Location shall include the reference number that was included in the previously sent Provide Subscriber Location.

3) When the SGSN/MSC completes the cancellation procedure, it notifies it to the GMLC in the Provide Subscriber Location Ack (with no location estimate included).

4) The GMLC informs the LCS Client that the cancellation procedure has been successfully completed.

3GPP TSG SA WG2 Meeting #27 **S2-022960**
Beijing, China, 14th – 18th October 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** 132 ⌘**rev** **-** ⌘ Current version: **4.7.0** ⌘

*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:	⌘	Addtion of reference number to deferred MT-LR procedure
Source:	⌘	NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	14/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

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

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

Reason for change:	⌘	LS from CN4 (S2-022795) decsribes as follows. *MAP_PROVIDE_SUBSCRIBER_LOCATION message to MAP_SUBSCRIBER_LOCATION_REPORT message in the current stage 3 specification. During the discussion, it was recognized that addition of reference number to the messages is needed so that the network can identify the correspondence of two messages. CN4 asks SA2 to decide which node (i.e. MSC/SGSN, GMLC or LCS client) assigns the reference number.* Therefore, addtion of reference number is needed to deferred MT-LR procedure. Addtion of the optional procedure that the SGSN/MSC may reject identical repeated deferred location requests for the same UE was agreed at the SA2#27 meeting. However, this is not essential correction and it affect the frozen stage3 specifioncation. Therefore, it shoud be cancelled.
Summary of change:	⌘	The reference number that is assigned by GMLC is added to the deferred MT-LR procedure. The procedure that that the SGSN/MSC may reject identical repeated deferred location requests for the same is deleted from the deferred MT-LR procedure
Consequences if not approved:	⌘	The specification cannot guarantee the GMLC to send the response to the corresponding request when the GMLC receives two or more deferred MT-LR for the same UE from the LCS client.

Clauses affected:	⌘	9.1.8.1, 9.1.8.2, 9.1.8.3			
Other specs	⌘	Y: X / N:	Other core specifications	⌘	TS29.002

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

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

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

<< First modifed Section>>

9.1.8.1 Deferred Location Request Procedure

1) GMLC assigns a reference number to Provide Subscriber Location. Provide Subscriber Location is received in SGSN/MSC as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number and the event that shall trigger the sending of Location Report.

Note: The GMLC shall send the Provide Subscriber Location for the UE regardless of the ongoing previous MT-LR for the same UE.

2) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned in step 3 with a suitable cause. ~~The SGSN/MSC may reject identical repeated deferred location requests for the same UE.~~ The SGSN/MSC verifies that the LCS client is allowed to position the requested UE according to subscription information (no interaction at this stage with the UE). If not, a Provide Subscriber Location return error is returned in step 3.

3) If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks in step 2 are satisfied, a Provide Subscriber Location ack. shall be returned to the GMLC without a location estimate.

4) The GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not.

9.1.8.2 Location Report Procedure

5) 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 adress of the new SGSN/MSC is included in Subscriber Location Report if available. (If new SGSN/MSC adress was included, the GMLC continues at step 1 above, otherwise it continues with an interrogation against HLR as described in 9.1.1.)

6) 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 checks fails, a Subscriber Location Report with the reference number that was included in the Provide Subscriber Location is returned with appropriate error cause indicating termination of the deferred location request.

7) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. ~~Included in~~ The report shall include ~~is~~ 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.

8) GMLC then returns the LCS Service Response to the LCS Client as in 9.1.2/9.1.6.

9.1.8.3 Cancellation of a Deferred Location Request

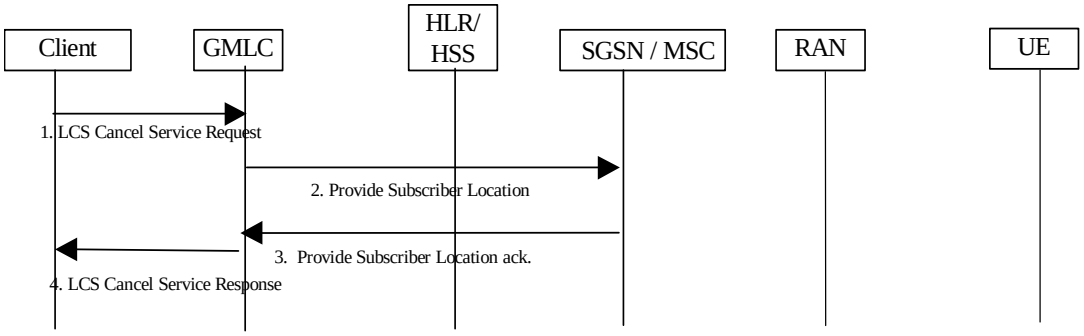

Figure 9.6b: Cancellation of a Deferred MT-LR procedure

1) The LCS Client requests the cancellation of a previously requested Deferred Location Request. The cancellation could be initiated by the GMLC itself for some reasons (e.g. implementation dependent timer in the GMLC expired). The event type to cancel must be indicated in the Cancellation procedure.

2) The GMLC will indicate this cancellation request in the Provide Subscriber Location toward the SGSN/MSC. The Provide Subscriber Location shall include the reference number that was included in the previously sent Provide Subscriber Location.

3) When the SGSN/MSC completes the cancellation procedure, it notifies it to the GMLC in the Provide Subscriber Location Ack (with no location estimate included).

4) The GMLC informs the LCS Client that the cancellation procedure has been successfully completed.