Technical Specification Group Services and System Aspects ***TSGS#16(02)0309***

Meeting #16, Marco Island, USA, 10-13 June 2002

Source: **TSG SA WG2**
Title: **CRs on 03.71, 23.171, 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 #16.
Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

On 03.71:

S2 Tdoc #	Spec	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-021182	03.71	41		R98	Correction of timing when SMLC enters LOCATION state.	F	7.9.0	7.10.0	LCS
S2-021183	03.71	42		R99	Correction of timing when SMLC enters LOCATION state.	A	8.5.0	8.6.0	LCS

On 23.171 Rel-99:

S2 Tdoc #	Spec	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-021391	23.171	25	2	R99	Clarification of CS-MO-LR procedures	F	3.7.0	3.8.0	LCS1

On 23.271 Rel-4 (no mirror CR)

S2 Tdoc #	Spec	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-021379	23.271	78	1	Rel-4	Remove 'HSS' from 23.271 Rel-4	F	4.5.0	4.6.0	LCS1

On 23.271 Rel-4 (with mirror CR to Rel-5)

S2 Tdoc #	Spec	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-021381	23.271	86	1	Rel-4	Clarification of CS-MO-LR/PS-MO-LR procedures	F	4.5.0	4.6.0	LCS1
S2-021382	23.271	87	1	Rel-5	Clarification of CS-MO-LR/PS-MO-LR procedures	A	5.2.0	5.3.0	LCS1

On 23.271 Rel-5:

S2 Tdoc #	Spec	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-021204	23.271	83		Rel-5	Handling of Location request without Codeword in GMLC	F	5.2.0	5.3.0	LCS1
S2-021216	23.271	88		Rel-5	Deleting version number of Mobile Location Protocol Specification from reference	F	5.2.0	5.3.0	LCS1
S2-021265rev1	23.271	89	1	Rel-5	Service type and codeword clarifications	F	5.2.0	5.3.0	LCS1
S2-021266	23.271	90		Rel-5	Requestor identity in LCS client name	F	5.2.0	5.3.0	LCS1
S2-021388	23.271	91	1	Rel-5	Privacy Class selection rule	F	5.2.0	5.3.0	LCS1
S2-021397	23.271	82	3	Rel-5	Modification to LCS to support North American E911	F	5.2.0	5.3.0	LCS1
S2-021398	23.271	85	3	Rel-5	Definition of "Enhanced User Privacy"	F	5.2.0	5.3.0	LCS1

S2-021475	23.271	84	5	Rel-5	Codeword check mechanism.	F	5.2.0	5.3.0	LCS1

On 23.271 Rel-6 (to be created on the basis of 23.271 v.5.3.0):

S2 Tdoc #	**Spec**	**CR #**	**rev**	**Rel**	**Title**	**cat**	**V in**	**V out**	**WI**
S2-021155	23.271	79		Rel-6	Introduction of the GMLC-GMLC Lr (roaming) interface: Clauses: 3, 4 & 5 changes	B	5.3.0	6.0.0	LCS2
S2-021156	23.271	80		Rel-6	Introduction of the GMLC-GMLC Lr (roaming) interface: Clauses: 6 & 8	B	5.3.0	6.0.0	LCS2
S2-021157	23.271	81		Rel-6	Introduction of the GMLC-GMLC Lr (roaming) interface: Clause: 9 changes	B	5.3.0	6.0.0	LCS2
S2-021242	23.271	92		Rel-6	Introduction of the GMLC-GMLC interface Clause 9: General Network Positioning Procedures	F	5.3.0	6.0.0	LCS2

3GPP TSG SA WG2 Meeting # 24 **S2-0201155**
Madrid, Spain, 22nd - 26th April 2002

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **79** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clauses: 3, 4 & 5: Abbreviations, Main Concepts and General LCS Architecture
Source:	⌘	Vodafone
Work item code:	⌘	TBN (S20020902 - Approved)
Date:	⌘	
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)*

Reason for change:	⌘	The introduction of the GMLC – GMLC Lr interface [proposed title], in accordance with LCS Work Item.
Summary of change:	⌘	Clause 3: Abbreviations for Home (H-GMLR), Requesting (R-GMLR) and Visited GMLR (V-GMLR) added Clauses 4, 5: New diagrams and explanatory text added for the GMLC – GMLC Lr (roaming) interface.
Consequences if not approved:	⌘	Stage 2 description of GMLC – GMLC interface will be incomplete

Clauses affected:	⌘	
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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3GPP TS23.271 v5.1.0

<<<First changed clause>>>

3.3 Abbreviations

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

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

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

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

<<<Next changed clause>>>

4 Main concepts

A general description of location services and service requirements are given in the specification TS 22.071 [4]. The positioning of the UE is a service provided by the Access Network. In particular, all Access Networks (e.g. UTRAN, GERAN), that facilitate determination of the locations of User Equipments, shall be able to exchange location information with the core network as defined in the present document (when connected to a Core Network). Optionally, location information may also be communicated between GMLCs, located in the same or a different PLMN, via the specified GMLC to GMLC interface.

By making use of the radio signals the capability to determine the (geographic) location of the user equipment (UE) or mobile station (UE) shall be provided. The location information may be requested by and reported to a client (application) associated with the UE, or by a client within or attached to the Core Network. The location information may also be utilised internally in the system; for example, for location assisted handover or to support other features such as home location billing. The position information shall be reported in standard, i.e. geographical co-ordinates, together with the time-of-day and the estimated errors (uncertainty) of the location of the UE according to specification TS 23.032 [11].

It shall be possible for the majority of the UE (active or idle) within a network to use the feature without compromising the radio transmission or signaling capabilities of the GSM/UMTS networks.

The UE and the network may support a number of different positioning methods and the UE may support or not support privacy invocation request and response. The UE informs the core network and radio access network about its LCS capabilities in this respect as defined in TS 24.008 [24] and TS 25.331 [24a].

The uncertainty of the location measurement shall be network design (implementation) dependent at the choice of the network operator, this is further described in TS 25.305 [1] and TS 43.059 [16].

There are many different possible uses for the location information. The positioning feature may be used internally by the GSM/UMTS network (or attached networks), by value-added network services, by the UE itself or through the network, and by "third party" services. The positioning feature may also be used by an emergency service (which may be mandated or "value-added"), but the position service is not exclusively for emergencies.

<<<Next changed clause>>>

5 General LCS architecture

5.1 LCS access interfaces ~~and reference points~~

One or more LCS Clients may access a Location Server via its Le interface. Location Servers, resident in the same or different PLMNs, may communicate with each other, indirectly, via the Lg interface to their associated MSC/SGSNs. Optionally, the Lr (?) interface, as specified for direct GMLC to GMLC messaging, may be used for this purpose. A fuller description of the LCS architecture, together with a diagram showing other LCS related interfaces, can be found in clause 6.

~~There is one reference point between the LCS server and LCS client called Le, see figure 5.1. Le is described in TS 22.071 [4], however the protocol specifics are for further study. There may be more than a single LCS network interface to several different LCS clients or other networks. These networks may both differ in ownership as well as in communications protocol. The network operator should define and negotiate interconnect with each external LCS client or other network.~~

~~An interface differs from a reference point in that an interface is defined where specific LCS information is exchanges and needs to be fully recognized.~~

~~There is an interface called Lg that connects two independent LCS networks (different PLMNs) for message exchange.~~

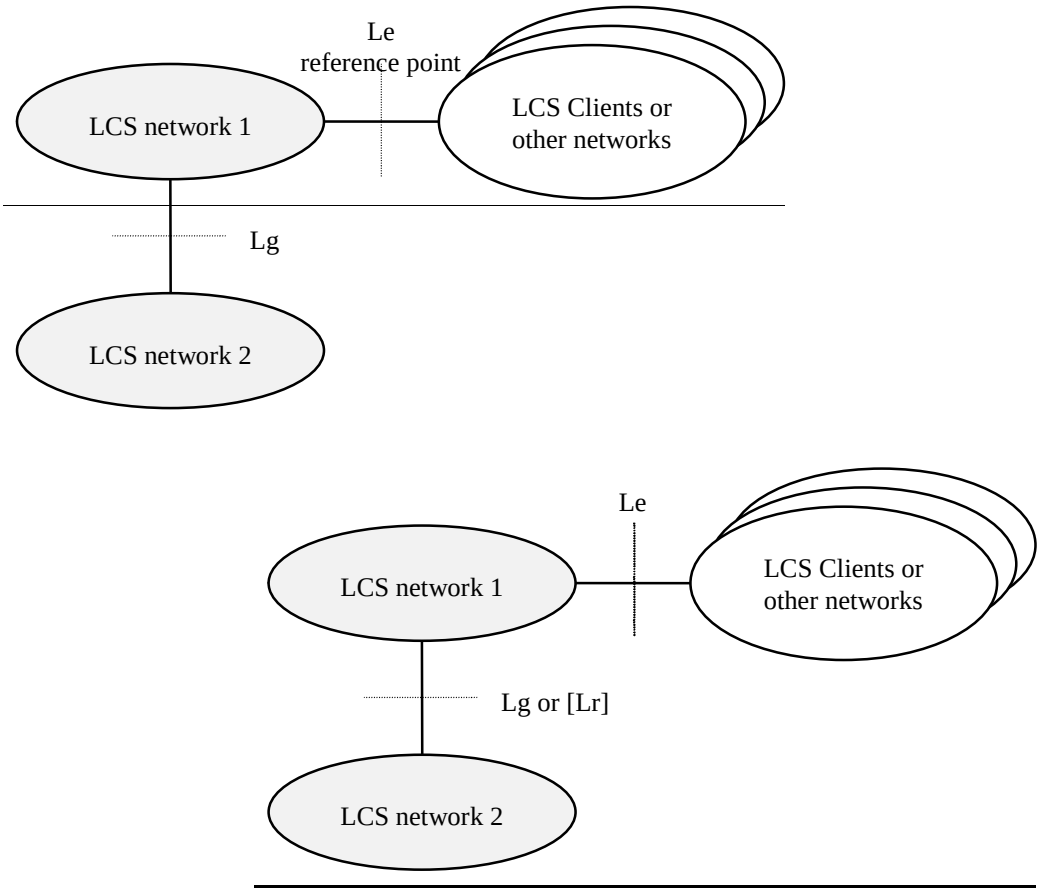

Figure 5.1: LCS Access Interfaces and Reference Points

<<<End of changes>>>

3GPP TSG-SA-WG2 Meeting #24 ***Tdoc: S2-021475***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.271** **CR** **084** ⌘ rev **5** ⌘ Current version: **5.2.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Codeword check mechanism.
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-26
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(essential 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)*

Reason for change:	⌘	In the current specification, Codeword is checked only in HLR/HSS. This may cause security and performance problems. In order to solve those problems, it is required to check Codeword in GMLC.
Summary of change:	⌘	Codeword is stored and is checked at GMLC in HPLMN or the target UE.
Consequences if not approved:	⌘	The security and performance problems remain in the specification.

Clauses affected:	⌘	9.1.1, 9.1.2.1, 9.1.6.1, 9.1.8.4, 10.1.1, 10.3		
Other specs affected:	⌘	**X** Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	29.002
Other comments:	⌘	The detail of the problems is explained in S2-021205		

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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

9.1.1 MT-LR routing procedure in PS and CS domain

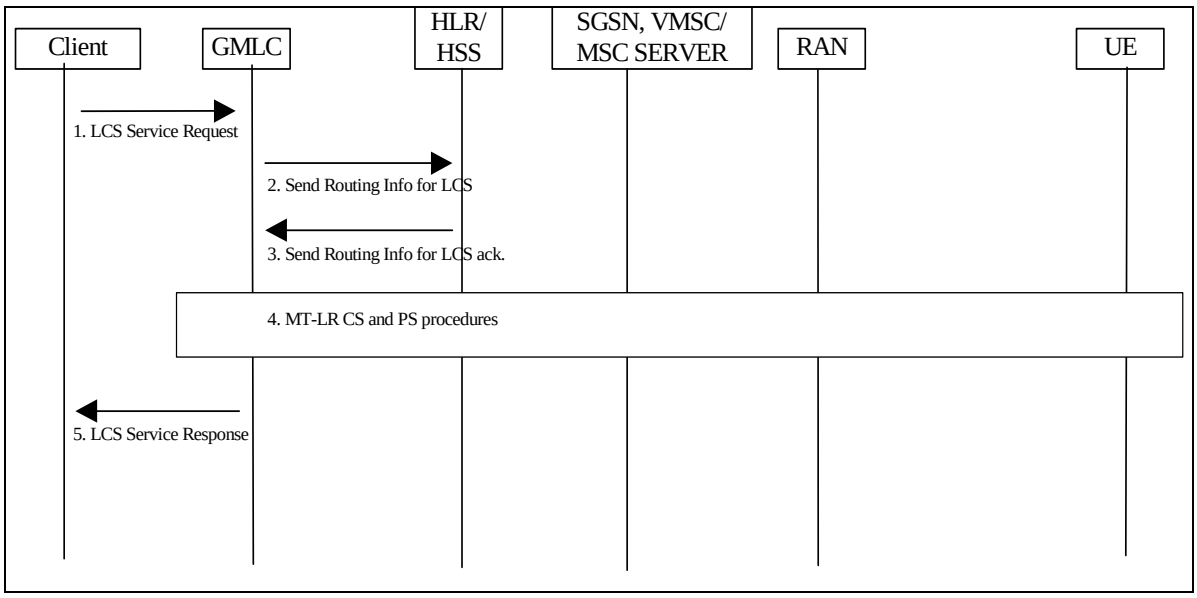

Figure 9.1: General Network Positioning for a MT-LR

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 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 GMLC stores the list of Codewords for the target UE and the received Codeword does not match one of the Codewords for the target UE, the GMLC shall reject the LCS request.
   If the codeword functionality is supported, the GMLC shall reject the LCS service request in case the LCS client type is "value added" and the codeword was not received.
   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 codeword functionality is not supported,~~ 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 the GMLC supports the codeword functionality , steps 2 and 3 shall not be skipped. The SEND_ROUTING_INFO_FOR_LCS message may carry also the Codeword received by the LCS client in the LCS Service request.~~ When~~For~~ 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.

~~The HLR may check if the codeword received in SEND_ROUTING_INFO_FOR_LCS message matches one of the codewords stored for the target subscriber. If it doesn't match, then the HLR shall return an error message to the GMLC. If no codeword is stored in the HLR for the target subscriber, the request shall not be rejected by the HLR and shall send to the GMLC the related indication in SEND_ROUTING_INFO_FOR_LCS_ack message. If the HLR receives the indication from the GMLC that the codeword is not applicable, the codeword check is not performed in the HLR.~~

Moreover, if the HLR supports the Enhanced User Privacy, the HLR shall check if the VMSC and/or the SGSN under which the target subscriber is located supports the enhanced user privacy mechanisms (Service type and Requestor), by checking the supported LCS capabilities set. Only the address of a serving node that supports the enhanced user privacy mechanism will be returned to GMLC. If none of the VMSC or SGSN supports the Enhanced User Privacy, then the HLR shall send an error indication to the GMLC.

NOTE: This handling allows the HPLMN to have the control about the fact that the VPLMN supports the EUP 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 modification >>

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 that ~~no~~ the codeword shall be sent to ~~was stored for~~ the UE user, the message may carry also the codeword received from the LCS client~~, to be displayed to the UE~~. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client.

3) If the GMLC is located in another PLMN or another country, the 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 modification >>

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 that ~~no~~the codeword shall be sent to ~~was stored for~~ the UE user, the message may carry also the codeword received from the LCS client~~, to be displayed to the UE~~. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client.

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

   FFS: The UE may be paged for location services even when in UMTS a signaling connection between mobile station and the network is established 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 modification >>

9.1.8.4 Cancellation of a Deferred Location Request

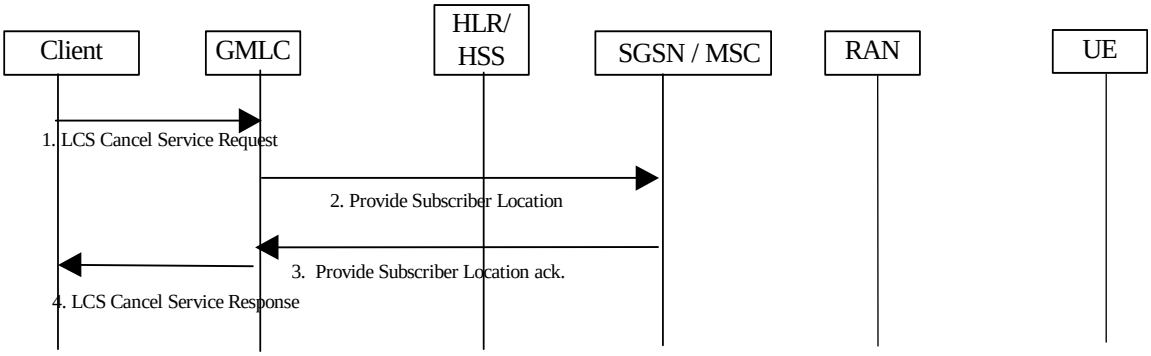

Figure 9.6c: Cancellation of a Deferred MT-LR procedure

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.

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.

<< Next modification >>

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 ~~a list~~ of codeword~~s~~ handling 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 10.1: 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	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

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 modification >>

10.3 GMLC

10.3.1 LCS Data in the GMLC for a LCS Client

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

Table10.7: GMLC Permanent Data for a LCS Client

LCS Client data in GMLC	Status	Description
LCS Client Type	M	Identifies the type LCS client from among the following: - Emergency Services - Value Added Services - PLMN Operator Services - Lawful Intercept Services
External identity	O	A list of one or more identifiers used to identify an external LCS client. The identity may be used when making an MT-LR and/or MO-LR. The format of the identity is international E.164 addresses. Each external identity shall be associated with a logical client name.
Authentication data	M	Data employed to authenticate the identity of an LCS client – details are outside the scope of the present document
Call/session related identity	O	A list of one or more international E.164 addresses, which are used to make calls by mobile subscribers, or APN-NIs (see NOTE) to identify the client for a call related MT-LR In case the LCS client was reached via IN or abbreviated number routing (e.g. toll free number or emergency call routing), the E.164 number(s) stored in the GMLC shall be the number(s) that the UE has to dial to reach the LCS Client. In these cases the E.164 number is not to be in international format. The country in which the national specific number(s) is (are) applicable is (are) also stored (or implied) in this case. Each call related identity may be associated with a specific external identity. Each call/session-related identity shall be associated with a logical client name.
Internal identity	O	Identifies the type PLMN operator services and the following classes are distinguished: - LCS client broadcasting location related information - O&M LCS client in the HPLMN - O&M LCS client in the VPLMN - LCS client recording anonymous location information - LCS Client supporting a bearer service, teleservice or supplementary service to the target UE This identity is applicable only to PLMN Operator Services.
Client name	O	An address string which is a logical name associated with LCS client's external identity (i.e., E.164 address).
Override capability	O	Indication of whether the LCS client possesses the override capability (not applicable to a value added and PLMN operator service)
Authorized UE List	O	A list of MSISDNs or groups of MSISDN for which the LCS client may issue a non-call related MT-LR. Separate lists of MSISDNs and groups of MSISDN may be associated with each distinct external or non-call related client identity.
Priority	M	The priority of the LCS client – to be treated as either the default priority when priority is not negotiated between the LCS server and client or the highest allowed priority when priority is negotiated
QoS parameters	M	The default QoS requirements for the LCS client, comprising: - Accuracy - Response time Separate default QoS parameters may be maintained for each distinct LCS client identity (external, non-call related, call related)
Allowed LCS Request Types	M	Indicates which of the following are allowed: - Non-call related CS-MT-LR/PS-MT-LR - Call/session related CS-MT-LR/PS-MT-LR - Specification or negotiation of priority - Specification or negotiation of QoS parameters - Request of current location - Request of current or last known location
Local Co-ordinate System	O	Definition of the co-ordinate system(s) in which a location estimate shall be provided – details are outside the scope of the present document
Access Barring List(s)	O	List(s) of MSISDNs or groups of MSISDN for which a location request is barred
Service Identities	O	List of service identities allowed for the LCS client.

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

10.3.2 LCS Data in the GMLC for a UE Subscriber

GMLC 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.

Table 10.8: 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.

3GPP TSG-SA-WG2 Meeting #24 ***Tdoc: S2-021398***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.271** **CR** **085** ⌘ rev **3** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Definition of "Enhanced User Privacy"
Source:	⌘	NEC
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-17
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(essential 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)

Reason for change:	⌘	In the current specification, the definition of "Enhanced User Privacy" is not clearly stated.
Summary of change:	⌘	Replace "Enhanced User Privacy" to "Rel-5 Enhanced User Privacy" and add the definition of "Rel-5 Enhanced User Privacy".
Consequences if not approved:	⌘	The definition of "Enhanced User Privacy" remains ambiguous and this may result misinterpretation of the specification.

Clauses affected:	⌘	9.1.1, 10.2, 10.5
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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

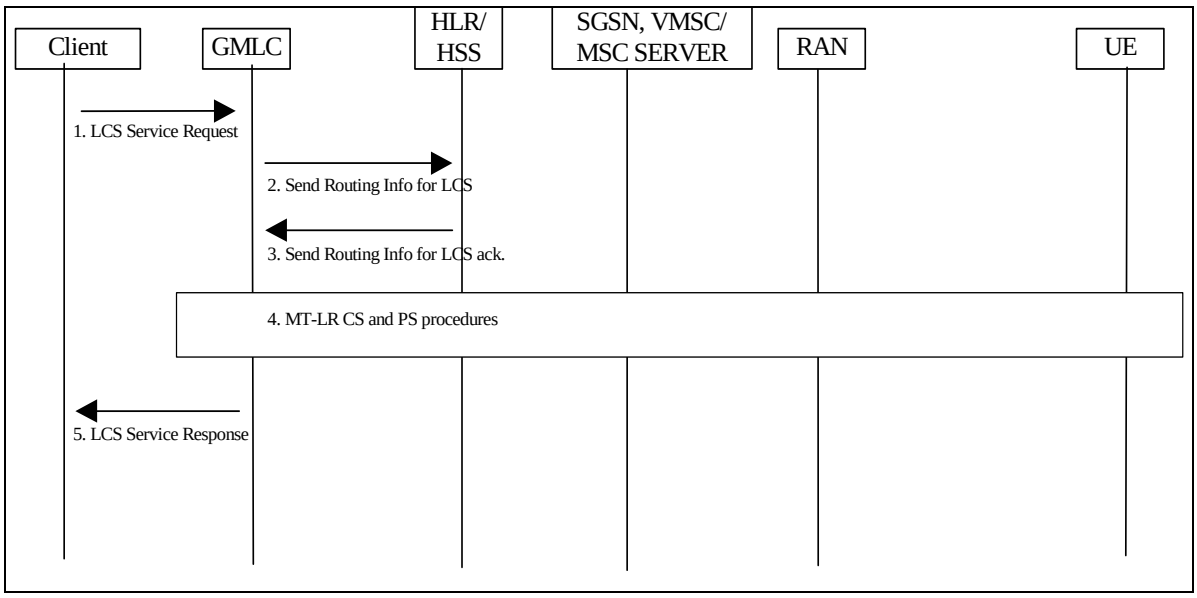

Figure 9.1: General Network Positioning for a MT-LR

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 codeword functionality is supported, the GMLC shall reject the LCS service request in case the LCS client type is “value added” and the codeword was not received.
   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 codeword functionality is not supported, 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 the GMLC supports the codeword functionality, steps 2 and 3 shall not be skipped. The SEND_ROUTING_INFO_FOR_LCS message may carry also the Codeword received by the LCS client in the LCS Service request. For a LCS client type different from “value added” an indication may be sent to the HLR, in order to inform the HLR 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 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.

The HLR may check if the codeword received in SEND_ROUTING_INFO_FOR_LCS message matches one of the codewords stored for the target subscriber. If it doesn't match, then the HLR shall return an error message to the GMLC. If no codeword is stored in the HLR for the target subscriber, the request shall not be rejected by the HLR and shall send to the GMLC the related indication in SEND_ROUTING_INFO_FOR_LCS_ack message. If the HLR receives the indication from the GMLC that the codeword is not applicable, the codeword check is not performed in the HLR.

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 ~~enhanced user privacy~~ mechanisms ~~(Service type and Requestor)~~, by checking the supported LCS capabilities set. Only the address of a serving node that supports the Rel-5 Enhanced User Privacy ~~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 ~~shall~~ may send an error indication to the GMLC.

NOTE: This handling allows the HPLMN to reject LCS requests when ~~have the control about the fact that~~ the VPLMN which the target subscriber is located does not support~~s~~ the Rel-5 Enhanced User Privacy~~EUP~~ 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 modified Section >>

10.2 VLR/SGSN

The VLR/SGSN contains the same LCS permanent data for each registered UE subscriber, as does the HLR/HSS. This data is downloaded to the VLR/SGSN as part of the location update procedure between the VLR/SGSN and HLR/HSS for an UE subscriber.

<< Next modified Section >>

10.5 Interworking between network nodes in different releases~~with pre-Rel'4 LCS~~

This clause describes possible scenarios for interworking ~~with a node which support only pre-Rel'4 LCS features and functions~~ between network nodes in different releases.

~~10.5.1 Interworking with the VLR supporting only pre-Rel'4 LCS~~

The serving node ~~VLR~~ that supports only pre-Rel'4 LCS cannot handle the extended privacy control for call-related/call-unrelated class of the Rel'4 LCS. That is, the serving node ~~VLR~~ cannot provide the extended call-related/call-unrelated class service to the user who subscribes to the Rel'4 LCS. Therefore HLR/HSS does not send the subscriber data on call-related/call-unrelated class for users who subscribe to the call-related class of Rel'4 LCS to the serving node ~~VLR~~ that supports only pre-Rel'4 LCS. The HLR/HSS is notified whether the serving node ~~VLR~~ supports Rel'4 LCS or not by an indication , which indicates all the LCS core network signalling capabilities the serving node ~~VLR~~ supports, from the serving node~~VLR~~ during location update procedure. The following LCS core network signalling capabilities are identified in the current version of this specification.

- LCS core network signalling capability set 1: R98 and R99 LCS (pre-Rel'4 LCS)
- LCS core network signalling capability set 2: Rel'4 or later LCS (no Rel-5 Enhanced User Privacy support)
- LCS core network signalling capability set 3: Rel'5 or later LCS (with Rel-5 Enhanced User Privacy support)

The serving node with the Rel-5 Enhanced User Privacy 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 core network signalling 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. A Rel'5 serving node without support for Rel-5 Enhanced User Privacy shall also indicate LCS core network signalling capability set 2.

The serving node, which notified the HLR/HSS that it supports LCS core network signalling capability set 3 shall be able to handle the Rel-5 Enhanced User Privacy mechanisms, as foreseen for rel-5. If the HLR/HSS is notified that the LCS capability set 3 is not supported, it may decide to not send the LCS subscriber data to the serving node~~VLR~~, in order to protect user privacy.

[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 newly introduced in Rel4 so that it doesn't appear in the specifications for R98 and R99 LCS]

3GPP TSG-SA2 Meeting #24
Madrid, Spain, 22-26 April, 2002

Tdoc S2-021397

CR-Form-v5.1

CHANGE REQUEST

⌘ **23.271** **CR** **82** ⌘ **rev** **3** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Modification to LCS to support North American E911
Source:	⌘	Lucent Technologies
Work item code:	⌘	LCS1
Date:	⌘	25/04/2002
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)

Reason for change:	⌘	Align Stage 2 with Stage 3 and provide necessary explanatory text.
Summary of change:	⌘	Text change to Clause 9.1.3 to indicate that subsequent PSLs from a GMLC to an MSC should be populated with an MSISDN from the pseudo-MSISDN received when an initial location was sent to the GMLC.
Consequences if not approved:	⌘	Stage 2 and Stage 3 mis-alignment

Clauses affected:	⌘	9.1.3
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

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

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

2.1 Normative references

[1] 3G TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".

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

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

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

[5] (void)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[31] LIF TS 101 V2.0.0 "Mobile Location Protocol Specification" (Location Interoperability Forum 2001) [Available at http://www.locationforum.org/public_document_area.htm]

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

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

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

Figure 9.3 illustrates current or last known location requests for a North American Emergency Services call, where an emergency services client (i.e., a Public Safety Answering Point) identifies the target UE and the serving GMLC using either an NA-ESRK~~IMSI~~, or an MSISDN and NA-ESRD~~or NA-ESRK plus, possibly IMEI,~~ that were previously provided to it by the VMSC. ~~The emergency services client also identifies the VMSC to the GMLC by providing an NA-ESRD or NA-ESRK or by referring to information for the target UE already stored in the GMLC.~~ This allows the GMLC to request location from the VMSC without first querying the home HLR of the target UE. ~~This is necessary when the home HLR either cannot be identified (e.g. client provides an NA-ESRK but not IMSI or MSISDN) or does not support the LCS query procedure.~~ This scenario presumes that the initial location, as well as UE and VMSC identifying information had been pushed to the GMLC as per [xx].

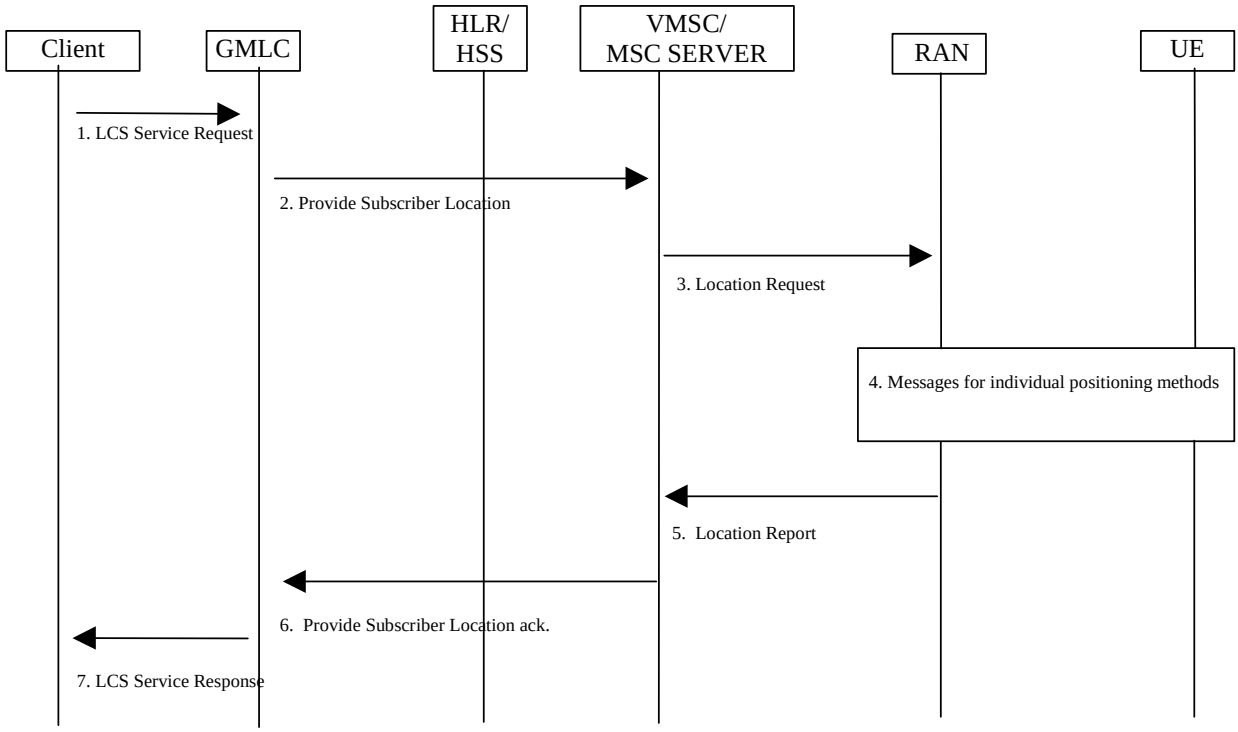

Figure 9.3: Positioning for a Emergency Services MT-LR without HLR Query

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

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

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

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

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

6) Same as steps 9 for a normal CS-MT-LR.

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

3GPP TSG-SA-WG2 Meeting #24 ***Tdoc: S2-021391***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.171** **CR** **025** ⌘ rev **2** ⌘ Current version: **3.7.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification of CS-MO-LR procedure
Source:	⌘	NEC
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-17
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(essential 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)*

Reason for change:	⌘	In CS-MO-LR procedure, it is not clear how 3G-VMSC gets a GMLC address when UE does not provide the GMLC address. Also, there is a "Note" about the handling of CS-MO-LR related to an emergency call, but the service requirement and detail procedure for CS-MO-LR with emergency call is not clear.
Summary of change:	⌘	The GMLC address is defined as a GMLC address stored in the 3G-VMSC. Also the "Note" is deleted.
Consequences if not approved:	⌘	The ambiguousness of the GMLC address remains.

Clauses affected:	⌘	8.8
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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

8.8 Mobile Originating Location Request

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

The following procedure shown in Figure 8.8 allows an UE to request either its own location, location assistance data or broadcast assistance data message ciphering keys from the network. Location assistance data may be used subsequently by the UE to compute its own location throughout an extended interval using a mobile based position method. The ciphering key enables the UE to decipher other location assistance data broadcast periodically by the network. The MO-LR after location update request may be used to request ciphering keys or GPS assistance data using the follow-on procedure described in TS 24.008. The procedure may also be used to enable an UE to request that its own location be sent to an externalanother LCS client.

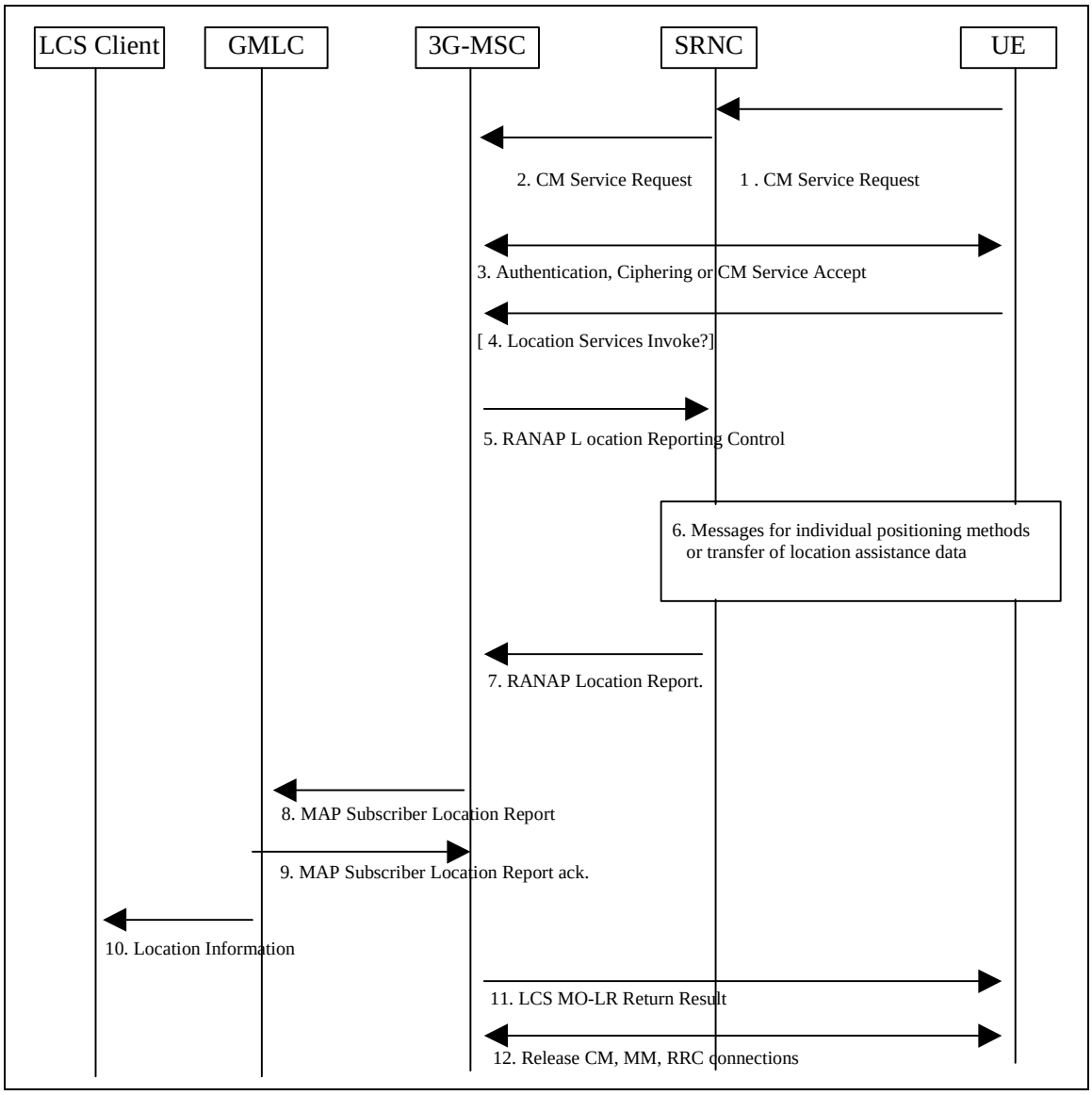

Figure 8.8:General Network Positioning for MO-LR

8.8.1.1 Location Preparation Procedure

1) If the UE is in idle mode, the UE requests an RACH and sends a CM service request indicating a request for a call independent supplementary services to the 3G-VMSC via the SRNC.

2) The SRNC shall convey the CM service request across the Iu-interface. If the UE is in dedicated mode, the UE sends a CM Service Request on the already established RACH.

3) The 3G-VMSC instigates authentication and ciphering if the UE was in idle mode or returns a Direct Transfer CM Service Accept if the UE was in dedicated mode. If the target UE supports any UE based or UE assisted positioning method(s), the UE will provide the SRNC and 3G-MSC with the positioning method(s) it supports via controlled early classmark sending.

4) The UE sends a LCS MO-LR Location Services invoke to the 3G-VMSC. Different types of location services can be requested: location of the UE, location of the UE to be sent to an external LCS client, location assistance data or broadcast assistance data message ciphering keys. If the UE is requesting its own location or that its own location be sent to an externalanother LCS client, this message carries LCS requested QoS information (e.g. accuracy, response time). If the UE is requesting that its location be sent to an externalanother LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed. If a GMLC address is not included, the 3G-VMSC may assign its own a GMLC address stored in the 3G-VMSC address and may verify that the identified LCS client is supported by this GMLC. If a GMLC address is not available for this case, the 3G-VMSC shall reject the location request. If the UE is instead requesting location assistance data or ciphering keys, the message specifies the type of assistance data or deciphering keys and the positioning method for which the assistance data or ciphering applies. The 3G-VMSC verifies in the UE's subscription profile that the UE has permission to request its own location, request that its location be sent to an externalanother LCS client or request location assistance data or deciphering keys (whichever applies). If the UE is requesting positioning and has an established call, the 3G-VMSC may reject the request for certain non-speech call types.

5) The 3G-VMSC sends a RANAP Location Reporting Control message to the SRNC associated with the Target UE. The RANAP message indicates whether a location estimate or location assistance data is requested and includes the UE's location capabilities. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data.

8.8.1.2 Positioning Measurement Establishment Procedure

6) If the UE is requesting its own location, the actions described under step 9 for a MT-LR are performed. If the UE is instead requesting location assistance data, the SRNC transfers this data to the UE as described in subsequent sections. The SRNC determines the exact location assistance data to transfer according to the type of data specified by the UE, the UE location capabilities and the current cell.

8.8.1.3 Location Calculation and Release Procedure

7) When a location estimate best satisfying the requested QoS has been obtained or when the requested location assistance data has been transferred to the UE, the SRNC returns a RANAP Location Report to the 3G-VMSC. This message carries the location estimate or ciphering keys if this was obtained. If a location estimate or deciphering keys were not successfully obtained or if the requested location assistance data could not be transferred successfully to the UE, a failure cause is included in the Location Report.

8) If the UE requested transfer of its location to an externalanother LCS client and a location estimate was successfully obtained, the 3G-VMSC shall send a MAP Subscriber Location Report to the GMLC obtained in step 4 carrying the MSISDN of the UE, the identity of the LCS client, the event causing the location estimate (MO-LR) and the location estimate and its age.

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

10) The GMLC transfers the location information to the LCS client either immediately or upon request from the client.

11) The 3G-VMSC returns an LCS MO-LR Return Result to the UE carrying any location estimate requested by the UE, ciphering keys or a confirmation that a location estimate was successfully transferred to the GMLC serving an LCS client.

12) The 3G-VMSC may release the CM, MM and RRC connections to the UE, if the UE was previously idle, and the 3G-VMSC may record billing information.

NOTE: n case of positioning of emergency call stage 3 of the pervious sequence is naturally omitted.

3GPP TSG-SA WG2 Meeting #24
Madrid, Spain, 22nd –26th April 2002

Tdoc S2-021388
(Revised S2-021267)

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **91** ⌘ **rev** **1** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Privacy Class selection rule
Source:	⌘	Ericsson, Nokia
Work item code:	⌘	LCS1
Date:	⌘	2002-04-04
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)

Reason for change:	⌘	The Privacy class selection rule needs to be updated to take in account the case in which the user subscribes service type privacy checking.
Summary of change:	⌘	The service type privacy checking is included in the privacy class selection rule.
Consequences if not approved:	⌘	Handling of interactions between service types and other classes not specified.

Clauses affected:	⌘	9.5.2, Annex A
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

****** FIRST 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 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.

****** 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

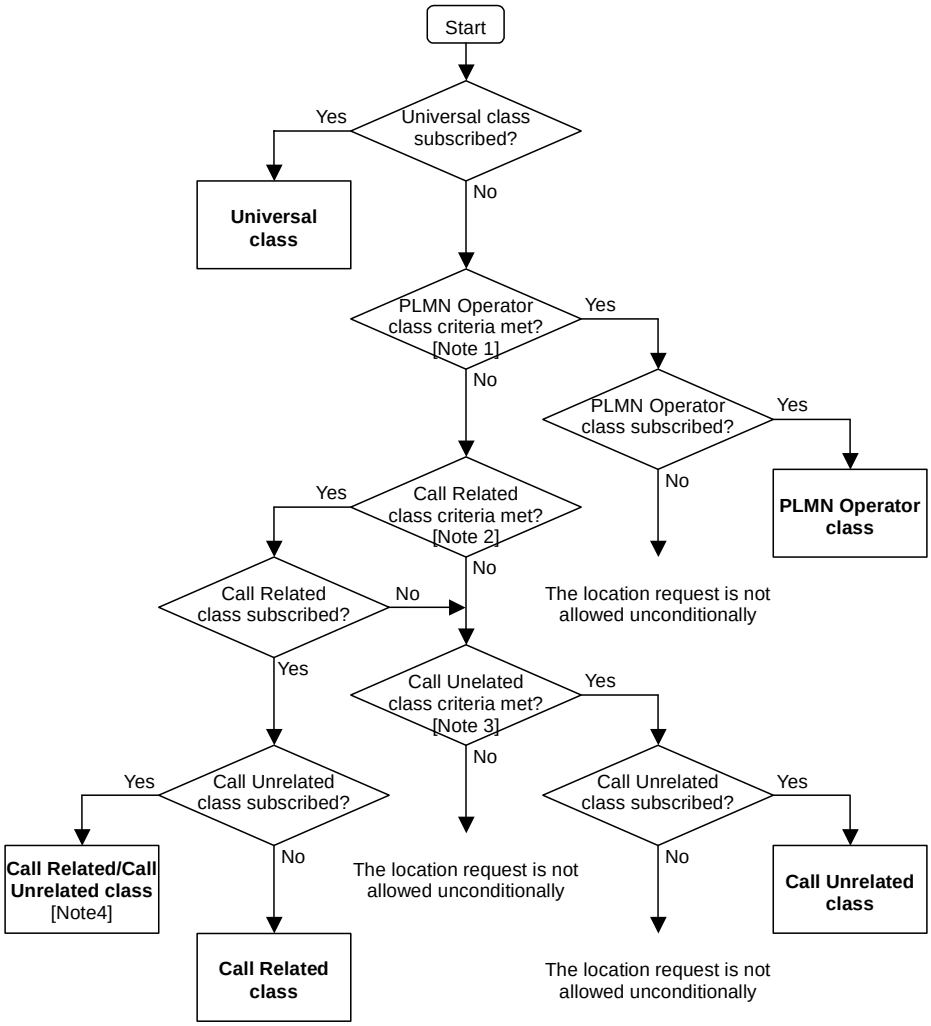

Figure A.1: Privacy Class selection flow diagram

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, 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-SA-WG2 Meeting #24 ***Tdoc: S2-021382***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.271** **CR** **087** ⌘ rev **1** ⌘ Current version: **5.2.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification of CS-MO-LR/PS-MO-LR procedures
Source:	⌘	NEC
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-17
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(essential 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)*

Reason for change:	⌘	In CS-MO-LR/PS-MO-LR procedure, it is not clear how MSC/SGSN gets a GMLC address when UE does not provide a GMLC address. Also, there is a "Note" about the handling of CS-MO-LR related to an emergency call, but the service requirement and detail procedure for CS-MO-LR with emergency call is not clear.
Summary of change:	⌘	Define the GMLC address as a GMLC address stored in the MSC/SGSN. Also the "Note" is deleted.
Consequences if not approved:	⌘	The ambiguousness of the GMLC address remains.

Clauses affected:	⌘	9.2
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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

9.2 Mobile Originating Location Request

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

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

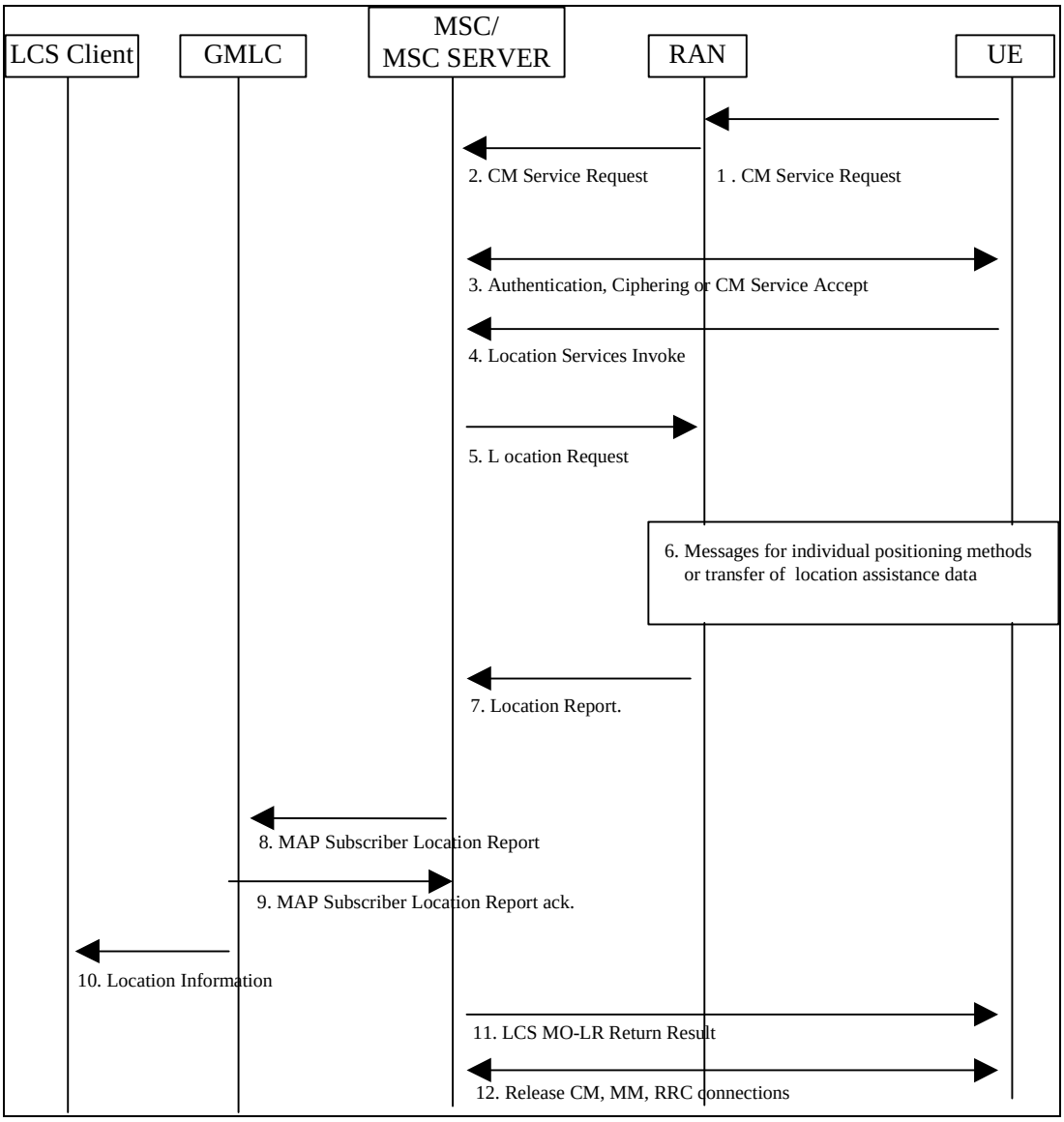


Figure 9.7: General Network Positioning for CS-MO-LR

9.2.1.1 Location Preparation Procedure

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

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

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

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

5) The VMSC/MSC server sends a Location Request message to RAN associated with the Target UE. The message indicates whether a location estimate or location assistance data is requested and, in GSM, includes the UE's location capabilities. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data.

9.2.1.2 Positioning Measurement Establishment Procedure

6) If the UE is requesting its own location, RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16]. If the UE is instead requesting location assistance data, RAN transfers this data to the UE as described in subsequent clauses in TS 25.305 [1] and TS 43.059 [16] UE.

9.2.1.3 Location Calculation and Release Procedure

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

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

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

10) The GMLC transfers the location information to the LCS client ~~either immediately or upon request from the client~~.

11) The VMSC/MSC server returns an CS-MO-LR Return Result to the UE carrying any location estimate requested by the UE, ciphering keys or a confirmation that a location estimate was successfully transferred to the GMLC serving an LCS client.

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

~~NOTE: In case of positioning of emergency call stage 3 of the pervious sequence is naturally omitted.~~

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

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

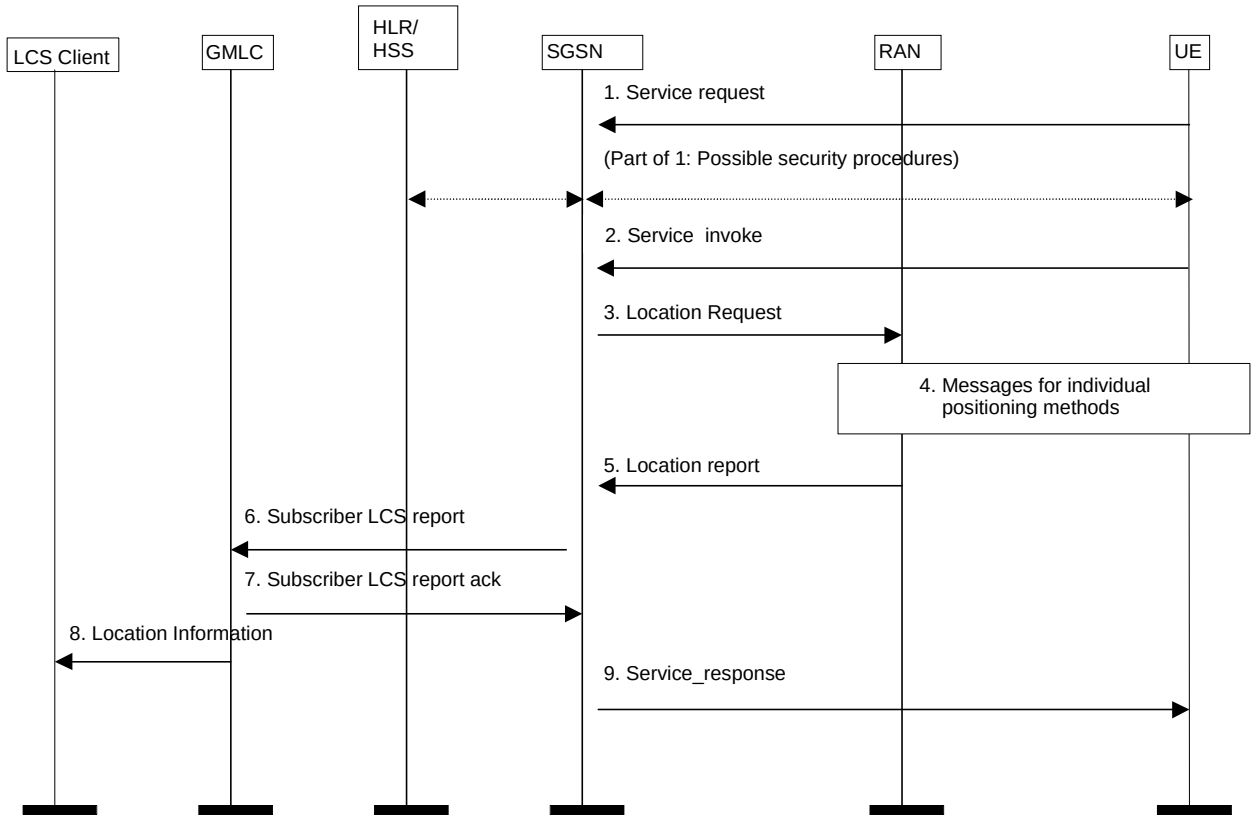


Figure 9.8: General Network Positioning for packet switched MO-LR

9.2.2.1 Location Preparation Procedure

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

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

3) The SGSN sends a Location Request message to the RAN associated with the Target UE's location. The message indicates whether a location estimate or location assistance data is requested. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data. The message carries also location parameters received in the Service Invoke message.

9.2.2.2 Positioning Measurement Establishment Procedure

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

9.2.2.3 Location Calculation and Release Procedure

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

6) If the UE requested transfer of its location to ~~another~~ an external LCS client and a location estimate was successfully obtained, the SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 2~~1~~ carrying the MSISDN ~~or PDP address~~ of the UE, the identity of the LCS client, the event causing the location estimate (MO-LR-PS) and the location estimate and its age.

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

8) The GMLC transfers the location information to the LCS client ~~either immediately or upon request from the client~~.

9) The SGSN returns a Service Response message to the UE carrying any location estimate requested by the UE, ciphering keys or a confirmation that a location estimate was successfully transferred to the GMLC serving an LCS client.

NOTE: Steps 2~~3~~ - 9 may be repeated a number of times in case of periodic location request.

3GPP TSG-SA-WG2 Meeting #24 ***Tdoc: S2-021381***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.271** **CR** **086** ⌘ rev **1** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification of CS-MO-LR/PS-MO-LR procedures
Source:	⌘	NEC
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-17
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(essential 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)*

Reason for change:	⌘	In CS-MO-LR/PS-MO-LR procedure, it is not clear how MSC/SGSN gets a GMLC address when UE does not provide a GMLC address. Also, there is a "Note" about the handling of CS-MO-LR related to an emergency call, but the service requirement and detail procedure for CS-MO-LR with emergency call is not clear.
Summary of change:	⌘	The GMLC address is defined as a GMLC address stored in the MSC/SGSN. Also the "Note" is deleted.
Consequences if not approved:	⌘	The ambiguousness of the GMLC address remains.

Clauses affected:	⌘	9.2
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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

9.2 Mobile Originating Location Request

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

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

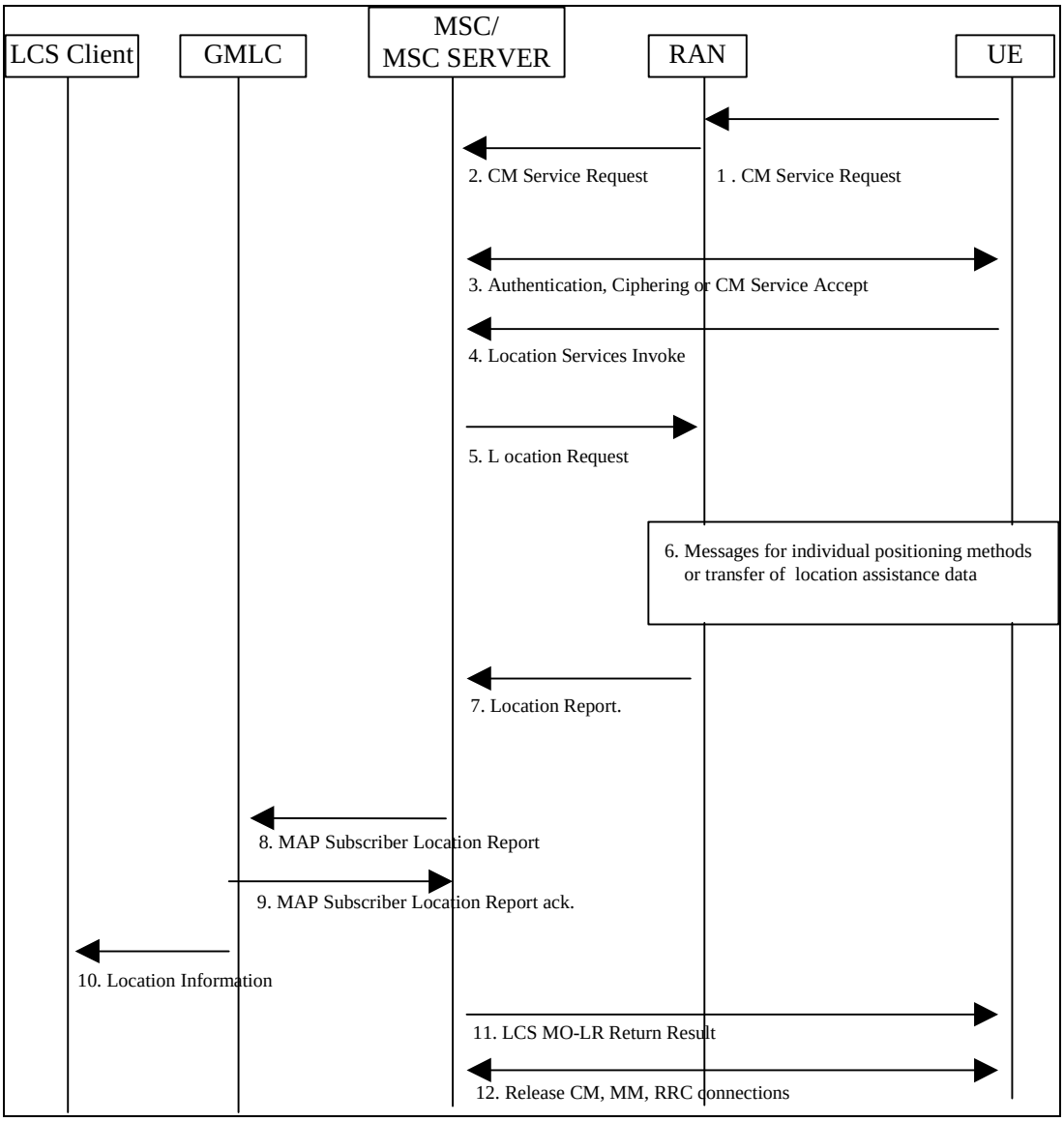


Figure 9.7: General Network Positioning for CS-MO-LR

9.2.1.1 Location Preparation Procedure

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

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

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

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

5) The VMSC/MSC server sends a Location Request message to RAN associated with the Target UE. The message indicates whether a location estimate or location assistance data is requested and, in GSM, includes the UE's location capabilities. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data.

9.2.1.2 Positioning Measurement Establishment Procedure

6) If the UE is requesting its own location, RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16]. If the UE is instead requesting location assistance data, RAN transfers this data to the UE as described in subsequent clauses in TS 25.305 [1] and TS 43.059 [16] UE.

9.2.1.3 Location Calculation and Release Procedure

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

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

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

10) The GMLC transfers the location information to the LCS client ~~either immediately or upon request from the client~~.

11) The VMSC/MSC server returns an CS-MO-LR Return Result to the UE carrying any location estimate requested by the UE, ciphering keys or a confirmation that a location estimate was successfully transferred to the GMLC serving an LCS client.

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

~~NOTE: In case of positioning of emergency call stage 3 of the pervious sequence is naturally omitted.~~

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

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

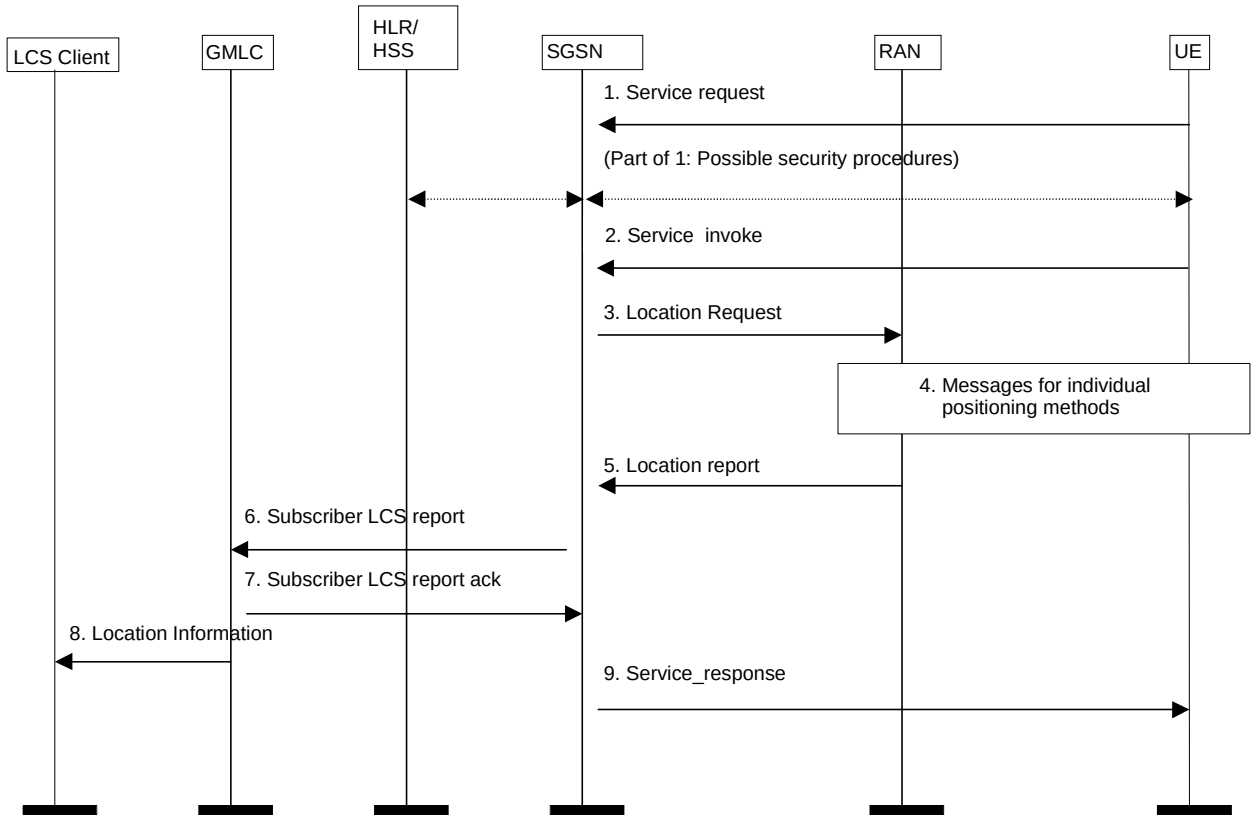


Figure 9.8: General Network Positioning for packet switched MO-LR

9.2.2.1 Location Preparation Procedure

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

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

3) The SGSN sends a Location Request message to the RAN associated with the Target UE's location. The message indicates whether a location estimate or location assistance data is requested. If the UE's location is requested, the message also includes the requested QoS. If location assistance data is requested, the message carries the requested types of location assistance data. The message carries also location parameters received in the Service Invoke message.

9.2.2.2 Positioning Measurement Establishment Procedure

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

9.2.2.3 Location Calculation and Release Procedure

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

6) If the UE requested transfer of its location to an external~~another~~ LCS client and a location estimate was successfully obtained, the SGSN shall send a MAP Subscriber Location Report to the GMLC obtained in step 1 carrying the MSISDN ~~or PDP address~~ of the UE, the identity of the LCS client, the event causing the location estimate (MO-LR-PS) and the location estimate and its age.

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

8) The GMLC transfers the location information to the LCS client ~~either immediately or upon request from the client~~.

9) The SGSN returns a Service Response message to the UE carrying any location estimate requested by the UE, ciphering keys or a confirmation that a location estimate was successfully transferred to the GMLC serving an LCS client.

NOTE: Steps 2~~3~~ - 9 may be repeated a number of times in case of periodic location request.

3GPP TSG-SA2 Meeting #24
Madrid, Spain, 22-26 Feb. 2002

Tdoc S2-021379
Revised S2-021147

CR-Form-v4

CHANGE REQUEST

⌘ **23.271** **CR** **078** Rev⌘ **1** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Remove "HSS" from TS 23.271 Rel-4
Source:	⌘	Nokia
Work item code:	⌘	LCS1
Date:	⌘	15 April 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)

Reason for change:	⌘	The 3GPP Rel-4 architecture does not define an element called HSS. Therefore HSS should be removed from Rel-4 TS 23.271
Summary of change:	⌘	HSS is removed from Rel-4 TS 23.271
Consequences if not approved:	⌘	There would be a contradictory between TS 23.002 and TS 23.271

Clauses affected:	⌘	
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

**** FIRST MODIFIED SECTION ****

Contents

****** NEXT MODIFIED SECTION ******

3.3 Abbreviations

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

2G-	Second Generation
3G-	Third Generation
AC	Admission Control
AI	Application Interface (prefix to interface class method)
ANM	Answer Message (ISUP)
APN	Access Point Name
APN-NI	APN Network Identifier
ARIB	Association of Radio Industries and Business
ATD	Absolute Time Difference
BCCH	Broadcast Control Channel
BER	Bit Error Rate

BSS	Base Station Subsystem
BTS	Base Transceiver Station
CAMEL	Customised Application For Mobile Network Enhanced Logic
CAP	CAMEL Application Part
CM	Connection Management
CN	Core Network
CSE	Camel Service Environment
DL	Downlink
DRNC	Drift RNC
E-OTD	Enhanced Observed Time Difference
FER	Frame Error Rate
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMLC	Gateway MLC
GPRS	General Packet Radio Service
GPS	Global Positioning System
HE	Home Environment
~~HSS~~	~~Home Subscriber Server~~
HLR	Home Location Register
HPLMN	Home Public Land Mobile Network
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IPDL	Idle Period Downlink
LA	Location Application
LAF	Location Application Function
LBS	Location Based Services
LCAF	Location Client Authorization Function
LCCF	Location Client Control Function
LCCTF	Location Client Co-ordinate Transformation Function
LCF	Location Client Function
LCS	LoCation Services
LDR	Location Deferred Request
LIR	Location Immediate Request,
LMU	Location Measurement Unit
LSAF	Location Subscriber Authorization Function
LSBcF	Location System Broadcast Function
LSBF	Location System Billing Function
LSCF	Location System Control Function
LSOF	Location System Operation Function
LSPF	Location Subscriber Privacy Function
MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Execution Environment
MLC	Mobile Location Center
MM	Mobility Management
MO-LR	Mobile Originated Location Request
MS	Mobile Station
MSC	Mobile Services switching Center
MSC	Mobile services Switching Centre
MSISDN	Mobile Station Integrated Services Data Network
MT-LR	Mobile Terminated Location Request
NA-ESRD	North American Emergency Service Routing Digits
NA-ESRK	North American Emergency Service Routing Key
NI-LR	Network Induced Location Request
OSA	Open Service Architecture
OTDOA	Observed Time Difference Of Arrival
PC	Power Control
PCF	Power Calculation Function
PLMN	Public Land Mobile Network
POI	Privacy Override Indicator
PRCF	Positioning Radio Co-ordination Function

PRRM	Positioning Radio Resource Management
PSE	Personal Service Environment
PSMF	Positioning Signal Measurement Function
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Routing Area
RACH	Random Access Channel
RAN	Radio Access Network
RANAP	Radio Access Network Application Part
RIS	Radio Interface Synchronization
RNC	Radio Network Controller
RRM	Radio Resource Management
RTD	Real Time Difference
SAT	SIM Application Tool-Kit
SCCP	Signalling Connection Control Part
SCS	Service Capability Server
SGSN	Serving GPRS Support Node, SGSN in this specification normally refers to 3G-SGSN only, SGSN in GSM is noted 2G-SGSN
SI	Service Interface (prefix to interface class method)
SIM	Subscriber Identity Module
SIR	Signal Interference Ratio
SLPP	Subscriber LCS Privacy Profile
SMLC	Serving Mobile Location Center
SMS	Short Message Service
SP	Service Point
SRNC	Serving RNC
SS7	Signaling System No 7
TA	Timing Advance
TMSI	Temporary Mobile Subscriber Identity
TOA	Time Of Arrival
UDT	SCCP Unitdata message
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunication System
USIM	Universal Subscriber Identity Module
UTRAN	Universal Terrestrial Radio Access Network
VASP	Value Added Service Provider
VHE	Virtual Home Environment
WCDMA	Wideband Code Division Multiple Access

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

****** NEXT MODIFIED SECTION ******

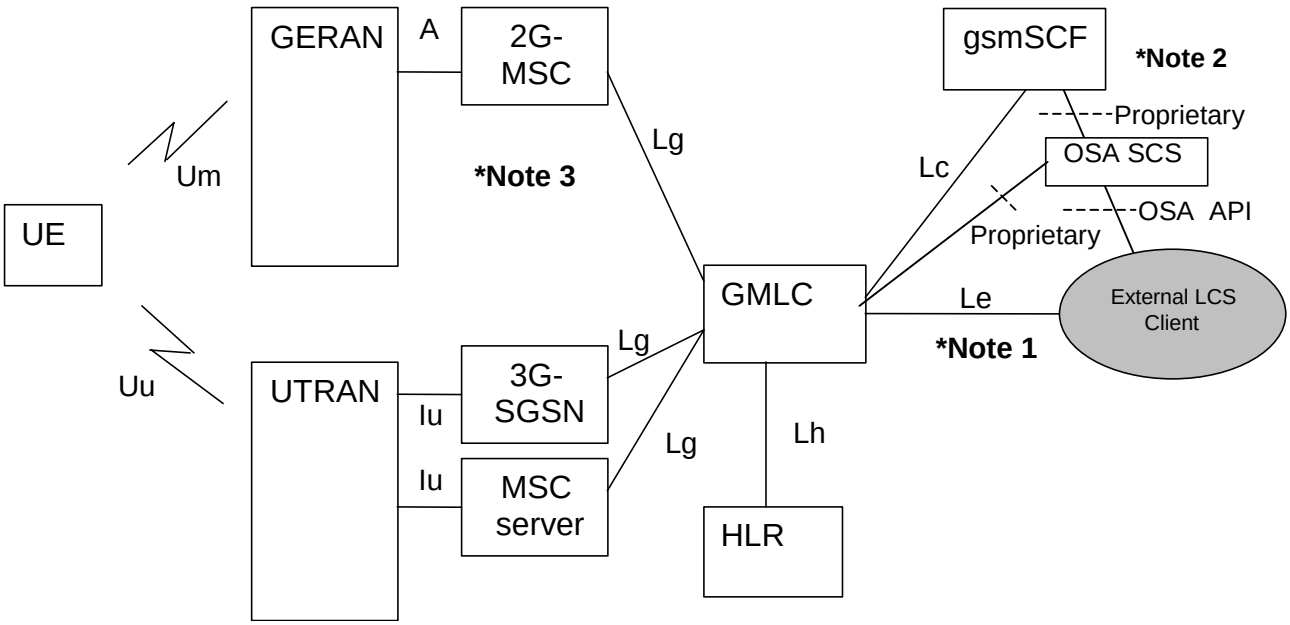
6 LCS Architecture

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

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

The clients make their requests to a LCS Server. There may be more than one LCS Server. The client must be authenticated and the resources of the network must be co-ordinated including the UE and the calculation functions, to

estimate the location of the UE and result returned to the client. As part of this process, information from other systems (other Access Networks) can be used. As part of the location information returned to the client, an estimate of the accuracy of the estimate and the time-of-day the measurement was made may be provided.



~~NOTE 1: HSS includes both 2G-HLR and 3G-HLR functionality. LCS should be included in the overall network architecture in TS 23.002 [20].~~

NOTE ~~2~~1: The Le interface is FFS.

NOTE ~~3~~2: As one alternative the LCS client may get location information directly from GMLC, which may contain OSA Mobility SCS with support for the OSA user location interfaces. See TS 23.127 [26] and TS 29.198 [27, 28, 29 and 30].

NOTE ~~4~~3: In GSM (Rel-4), positioning is only supported on the A interface

Figure 6.1: General arrangement of LCS

**** NEXT MODIFIED SECTION ****

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~~	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	X		
LSPF				X	X	X	
Positioning functions							
PRCF		X					
PCF	X	X					
PSMF	X	X					
PRRM		X					
	UE	**RAN**	**GMLC**	**SGSN**	**MSC/MSC Server**		**Client**

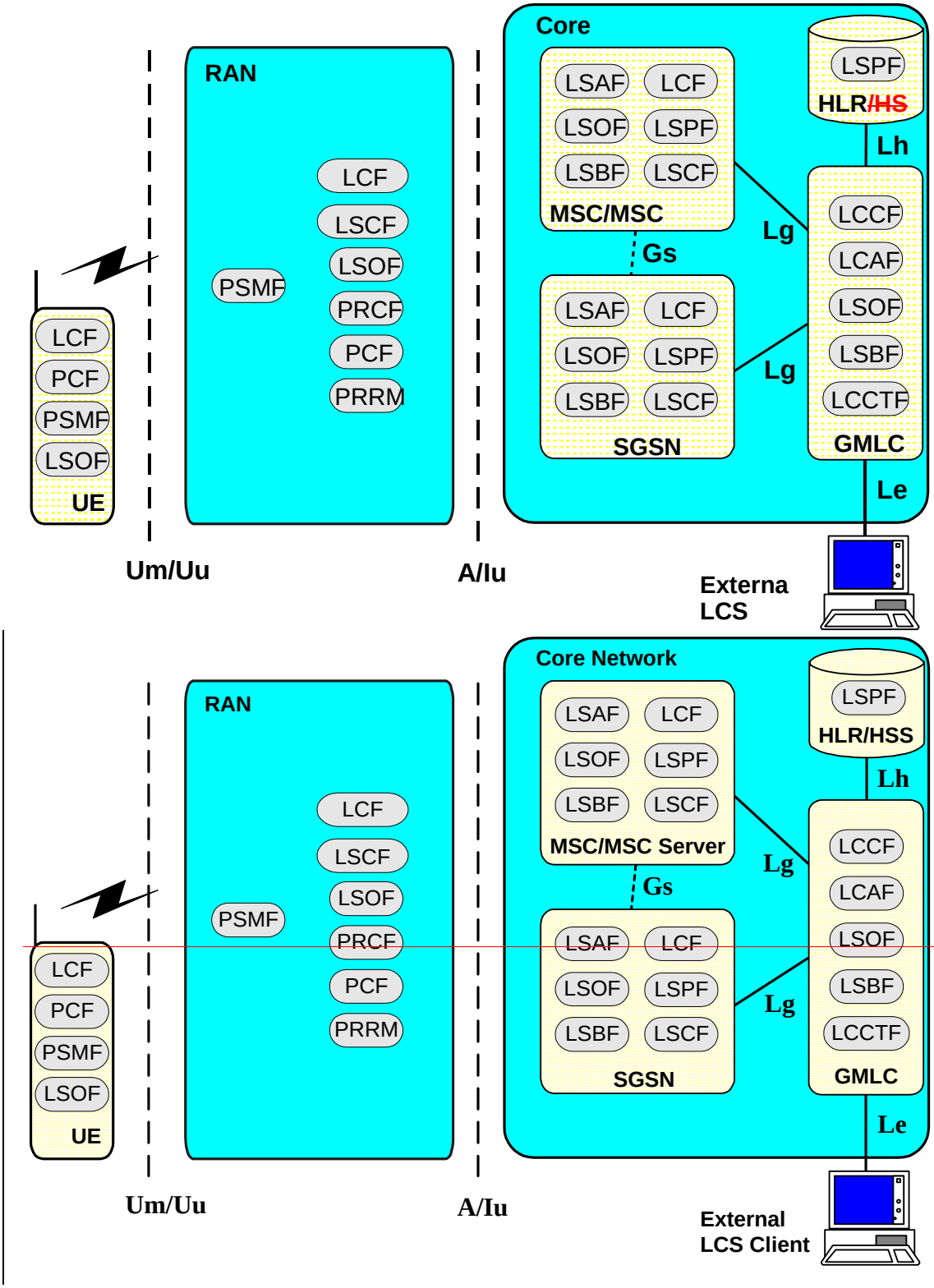


Figure 6.2: Generic LCS Logical Architecture

****** NEXT MODIFIED SECTION ******

6.3.3 Gateway Mobile Location Center, GMLC

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

The GMLC is the first node an external LCS client accesses in a GSM PLMN (i.e. the Le reference point is supported by the GMLC). The GMLC may request routing information from the HLR or ~~HSS~~ via the Lh interface. After performing registration authorization, it sends positioning requests to either VMSC, SGSN or MSC Server and receives final location estimates from the corresponding entity via Lg interface.

****** REMOVED SECTION ******

~~6.3.9 HSS~~

~~The HSS contains LCS subscription data and routing information. The HSS is accessible from the GMLC via the Lh interface. For roaming UEs, HSS may be in a different PLMN.~~

****** NEXT MODIFIED SECTION ******

7.3 MAP Interfaces

The following interfaces are based on MAP in LCS.

- Lh interface: interface between GMLC and HLR. This interface is used by the GMLC to request the address of the visited MSC or SGSN for a particular target UE whose location has been requested.
- Lg interface:interface between GMLC MSC and GMLC - SGSN. This interface is used by the GMLC to convey a location request to the MSC or SGSN currently serving a particular target UE whose location was requested. The interface is used by the MSC or SGSN to return location results to the GMLC.
- Lc: interface between GMLC and gsmSCF, CAMEL. This interface is used to get location information for CAMEL based services.

The following MAP services are defined for LCS.

- MAP-SEND-ROUTING-INFO-FOR-LCS Service.

This service is used between the GMLC and the HLR~~/HSS~~ to retrieve the routing information needed for routing a location service request to the serving VMSC , SGSN. ~~The service may be used in GMLC - HSS interface to retrieve routing information in order to route the location service request to the correct VMSC, SGSN and MSC Server.~~

- MAP-PROVIDE-SUBSCRIBER-LOCATION Service.

This service is used by a GMLC to request the location of a target UE from the visited MSC, SGSN or MSC Server at any time.

- MAP-SUBSCRIBER-LOCATION-REPORT Service.

This service is used by a VMSC, SGSN or MSC Server to provide the location of a target UE to a GMLC when a request for location is either implicitly administered or made at some earlier time.

The MAP Subscriber Location Report could also be used to send information about location of the Target UE (for MO-LR) to an external client.

****** NEXT MODIFIED SECTION ******

8.1.1.2 INTERROGATION State

In this state, the GMLC has sent an interrogation to the home HLR~~/HSS~~ of the UE to be located and is awaiting a response giving one or several of the following addresses:the VMSC, MSC Server, SGSN address and IMSI for this UE.

****** NEXT MODIFIED SECTION ******

8.1.2.1 State Transitions

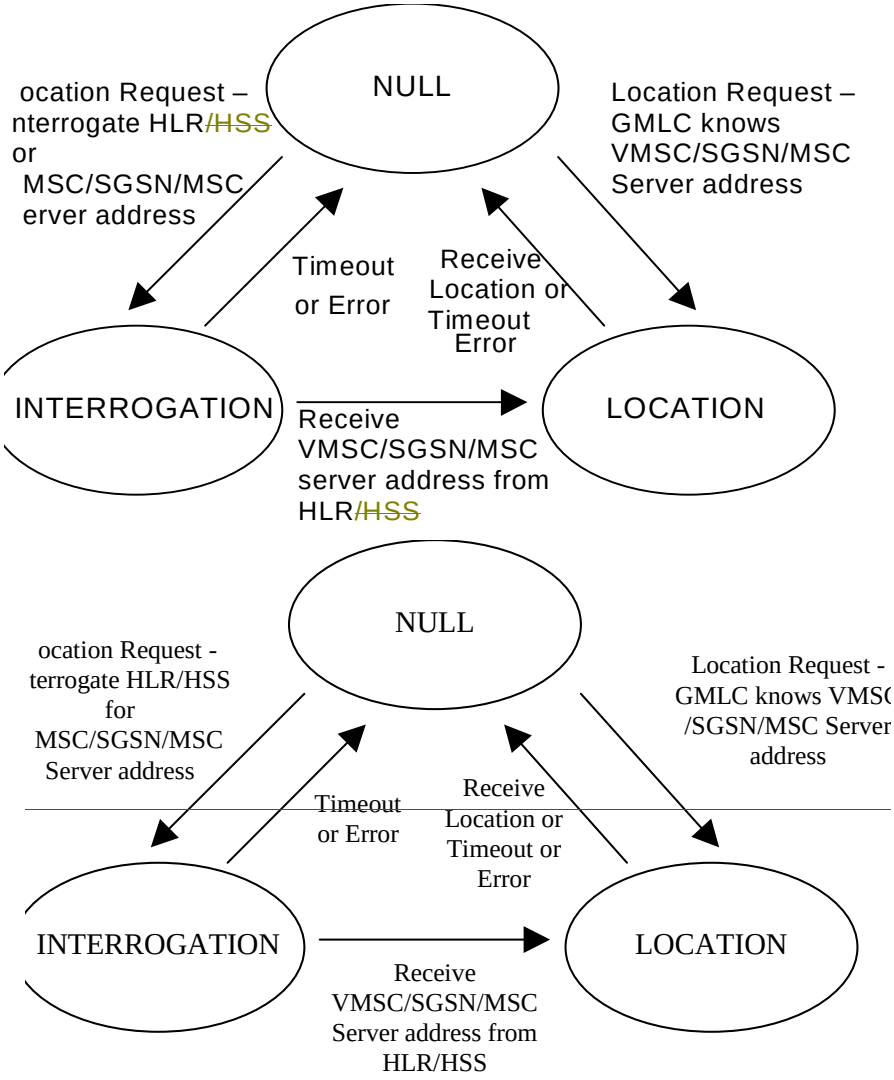


Figure 8.1: State Transitions in the GMLC

Moving from NULL to INTERROGATION state:

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

Moving from NULL to LOCATION state:

If the GMLC already knows one of the following addresses: VMSC, MSC Server, SGSN or UE IMSI, when it receives a location service request from some LCS client (e.g. from information retained for an earlier location request for the same UE), it moves from the NULL state to the LOCATION state and sends a location request to either the VMSC, MSC Server or SGSN.

NOTE: It is for further study how GMLC selects if it shall send the location request to VMSC, MSC server and/or SGSN in different cases. This should be specified in the signaling procedures.

Moving from INTERROGATION to LOCATION state:

After the GMLC, in the INTERROGATION state, receives one or several of the addresses VMSC, MSC Server, SGSN, and IMSI from the home HLR~~/HSS~~, it enters the LOCATION state and sends a location request to either the VMSC, MSC Server or SGSN of the UE being located.

Moving from LOCATION to NULL state:

After the GMLC receives a location estimate response from the VMSC, MSC Server or SGSN, it forwards the location estimate to the requesting LCS client and re-enters the NULL state.

**** NEXT MODIFIED SECTION ****

8.1.2.2 INTERROGATION Timer Function

The GMLC runs a timer while in the INTERROGATION state to limit the amount of time waiting for an interrogation response from the HLR~~/HSS~~. If the timer expires before an interrogation response is received, the GMLC indicates a location failure to the LCS client and re-enters the NULL state.

****** NEXT MODIFIED SECTION ******

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

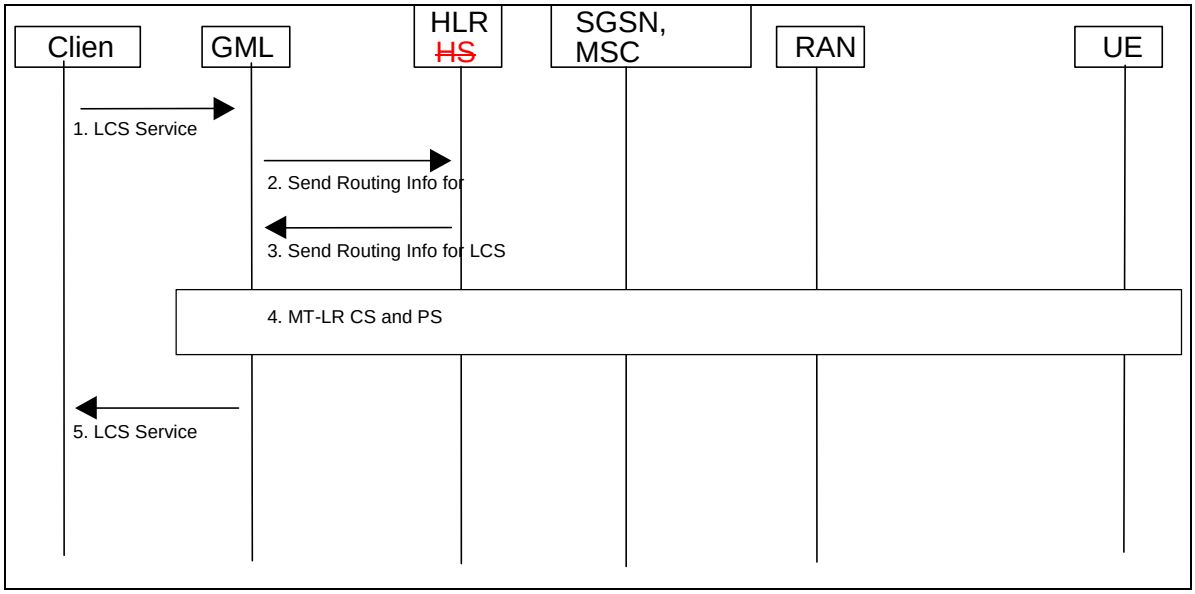


Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the GMLC obtains and authenticates the called party number of the LCS client. For a session related location request, the GMLC obtains and authenticates the APN-NI of the LCS client. If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated. Note: This means that GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

2) If the GMLC already knows both the VMSC/MSC server or SGSN (Note: only applicable to 3G-SGSN in Rel-4) location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), this step and step 3 may be skipped. Otherwise, the GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR~~/HSS~~ of the target UE to be located with the IMSI or MSISDN of this UE.

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 may prioritize between the MSC/VLR or SGSN address sent to GMLC. The priority criteria are for further study.

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

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on subscription information for the LCS client, possible priority information returned by the HLR~~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.

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

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

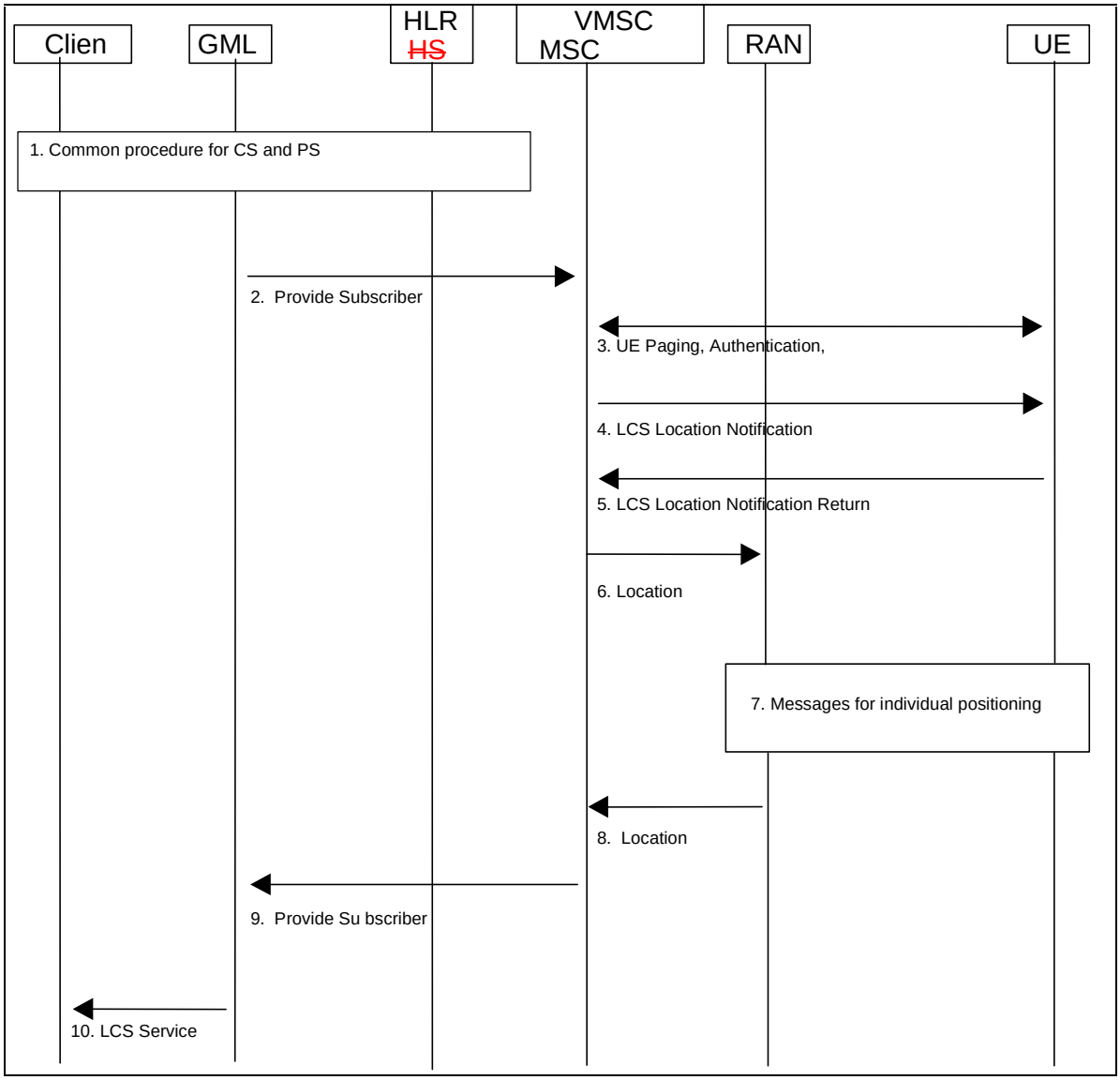


Figure 9.2: Network Positioning for a CS-MT-LR

9.1.2.1 Location Preparation Procedure

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

2) The GMLC sends a PROVIDE_ SUBSCRIBER _LOCATION message to the MSC/MSC server indicated by the HLR~~/HSS~~. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a call related location request, the message also carries the LCS client's called party number. For a value added LCS client, the message shall carry the client name and the external identity of the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client.

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

Figure 9.3 illustrates location for a North American Emergency Services call, where an emergency services client identifies the target UE using an IMSI, MSISDN or NA-ESRK plus, possibly IMEI, that were previously provided to it by the VMSC. The emergency services client also identifies the VMSC to the GMLC by providing an NA-ESRD or NA-ESRK or by referring to information for the target UE already stored in the GMLC. This allows the GMLC to request location from the VMSC without first querying the home HLR of the target UE. This is necessary when the home HLR either cannot be identified (e.g. client provides an NA-ESRK but not IMSI or MSISDN) or does not support the LCS query procedure.

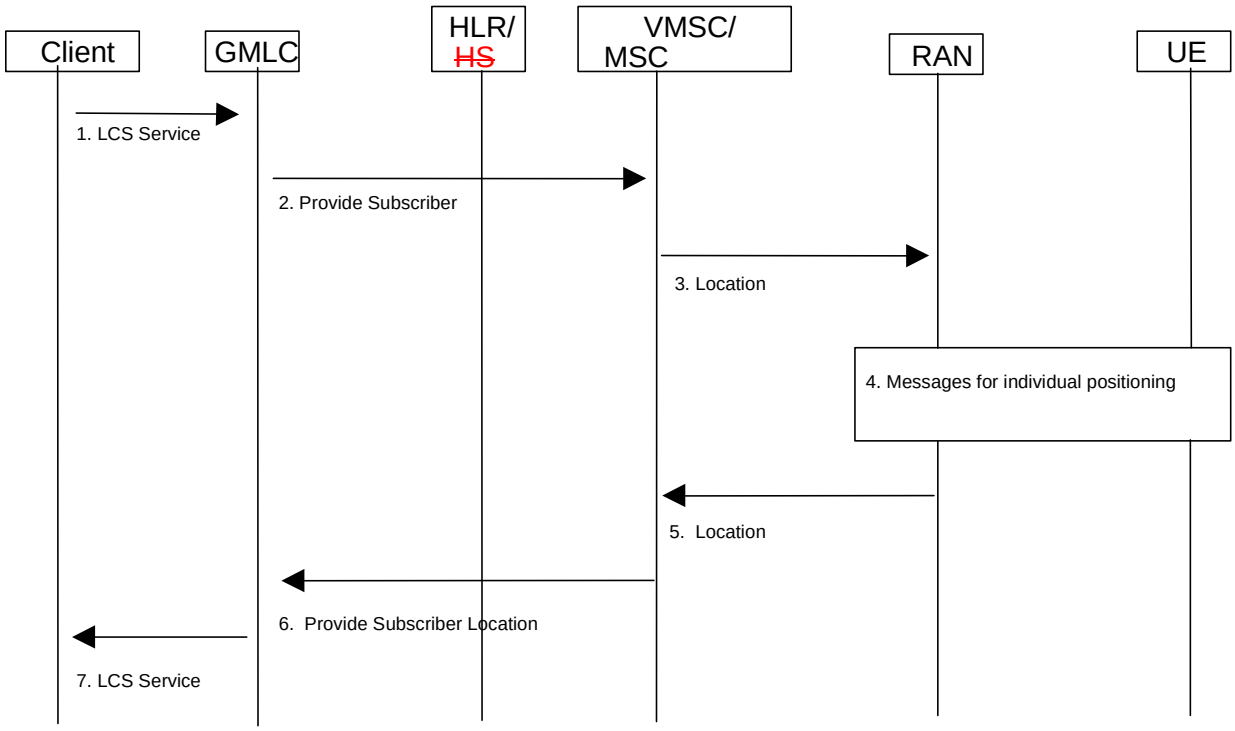


Figure 9.3: Positioning for a Emergency Services MT-LR without HLR Query

9.1.4.5.4 MSC Server or SGSN.Target UE is "Purged"

If the target UE is marked as "Purged" in HLR~~/HSS~~, then an indication "Absent Subscriber" is returned to the GMLC.

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

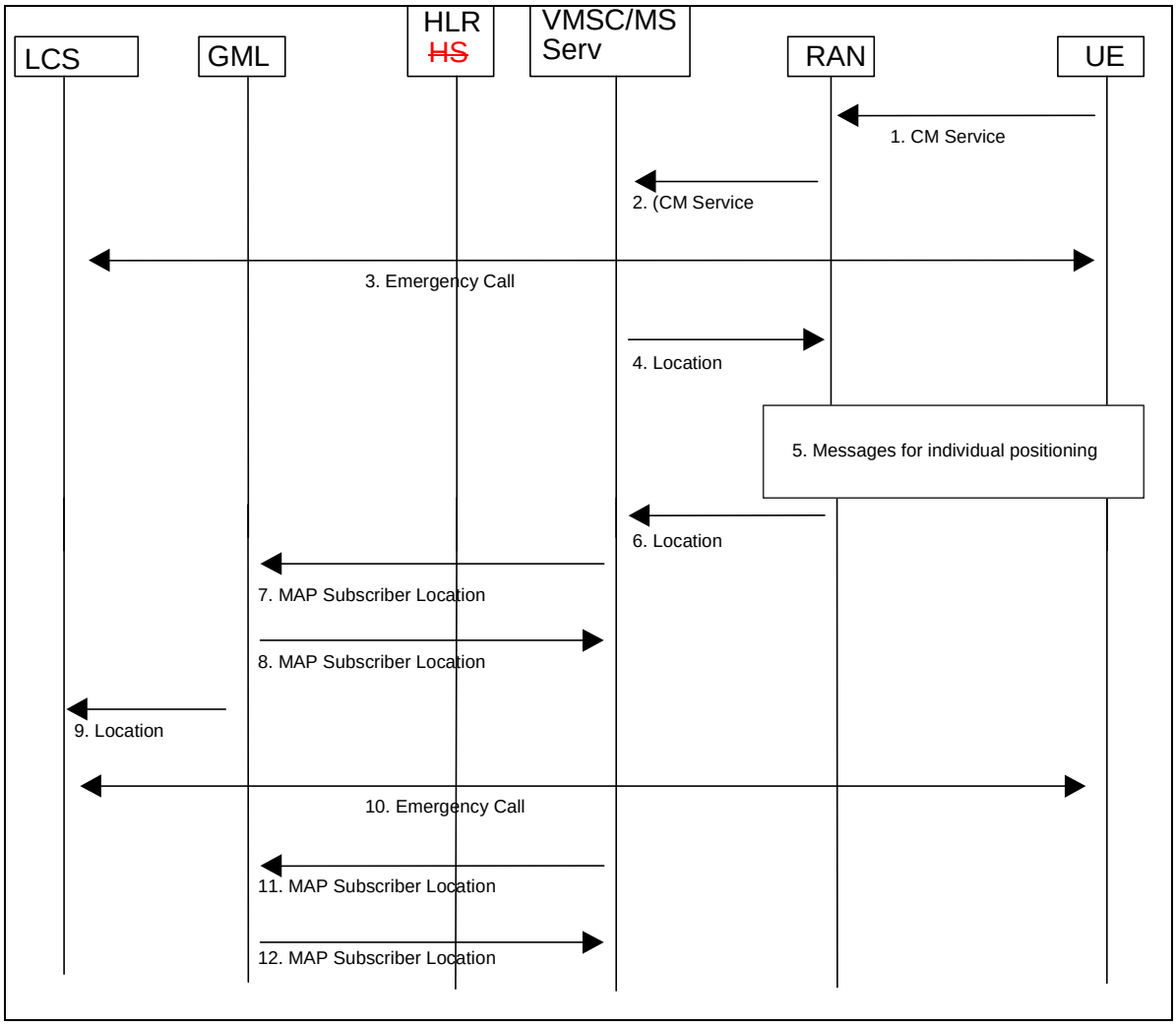


Figure 9.4: Positioning for a NI-LR Emergency Service Call

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

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

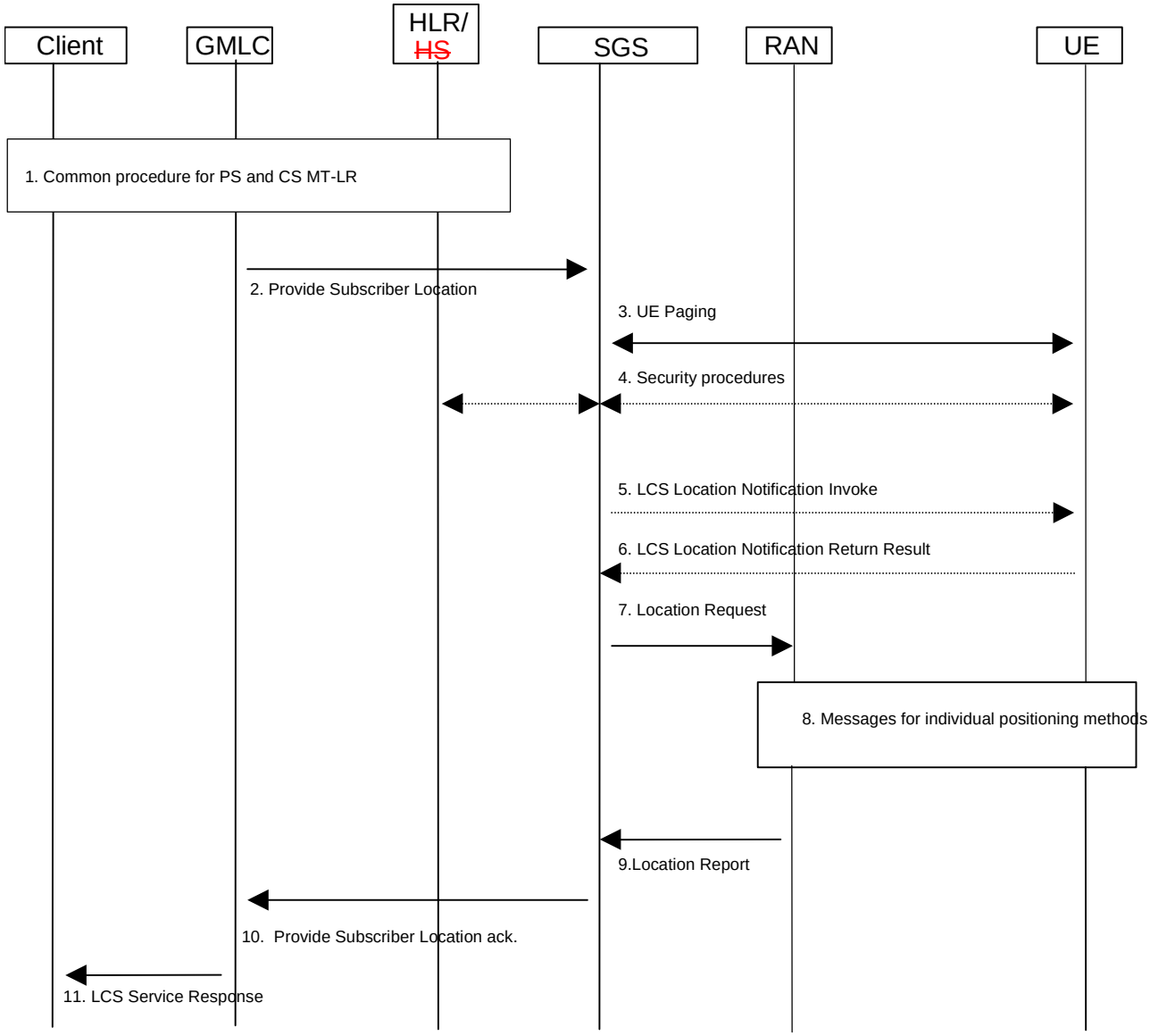


Figure 9.5: General Network Positioning for Packet Switched MT-LR

9.1.6.1 Location Preparation Procedure

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

2) GMLC sends a Provide Subscriber Location message to the SGSN indicated by the HLR~~/HSS~~. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a session related location request, the message also carries the APN-NI to which the user has established the session. For a value added LCS client, the message shall carry the client name and the external identity of the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client.

9.1.7 Packet Switched Network Induced Location Request (PS-NI-LR)

Figure 9.6 illustrates a network induced location request from the SGSN. This procedure may be used e.g. for positioning of an emergency call.

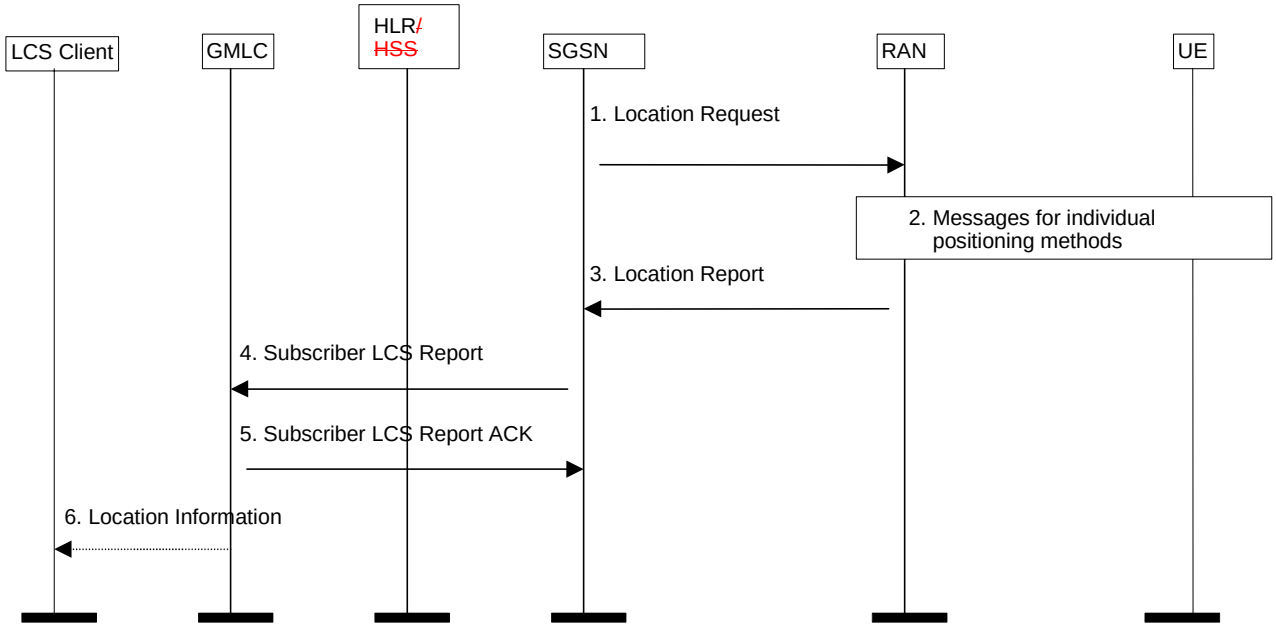


Figure 9.6: Network Induced Location Request

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.

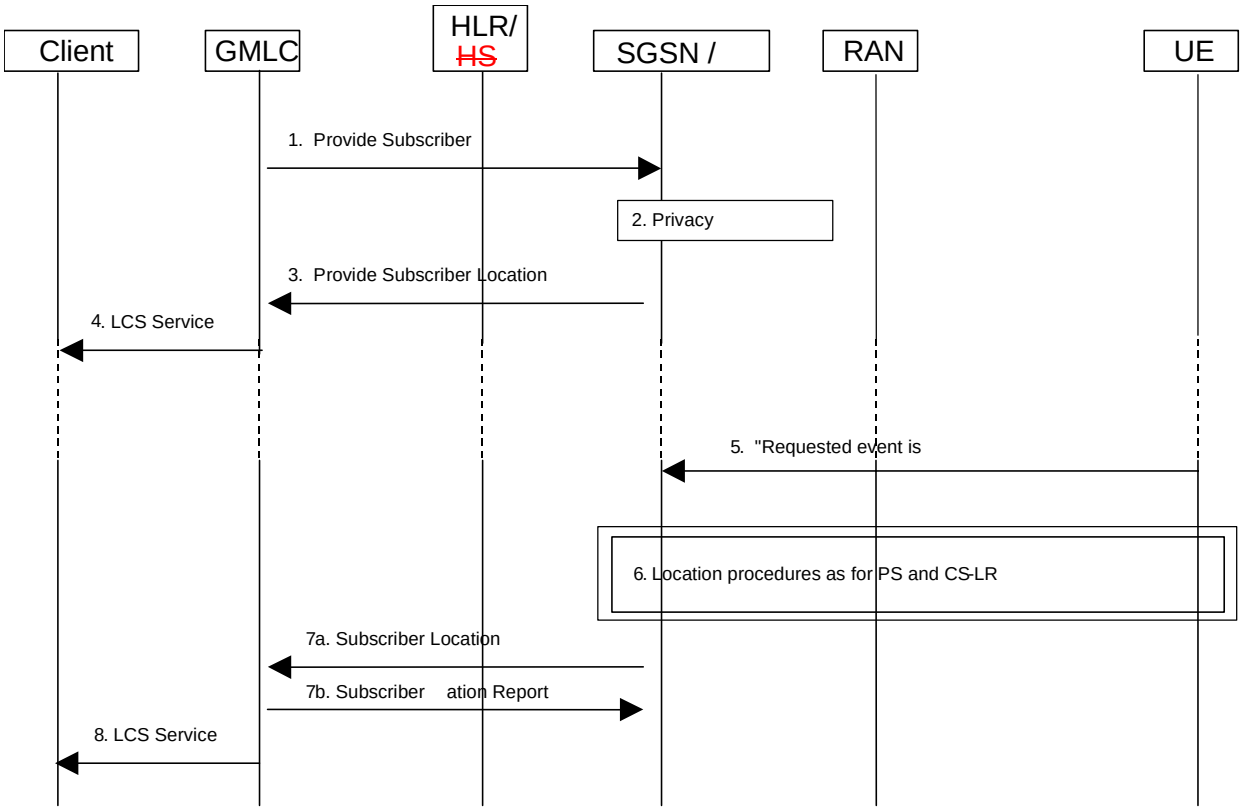


Figure 9.6a: General Network Positioning for a Deferred MT-LR

9.1.8.3 Cancellation of a Deferred Location Request

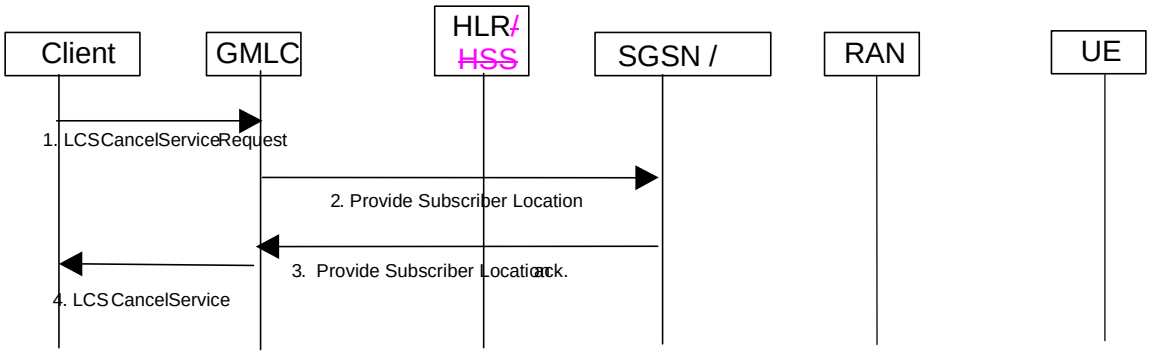


Figure 9.6b: Cancellation of a Deferred MT-LR procedure

****** NEXT MODIFIED SECTION ******

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

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

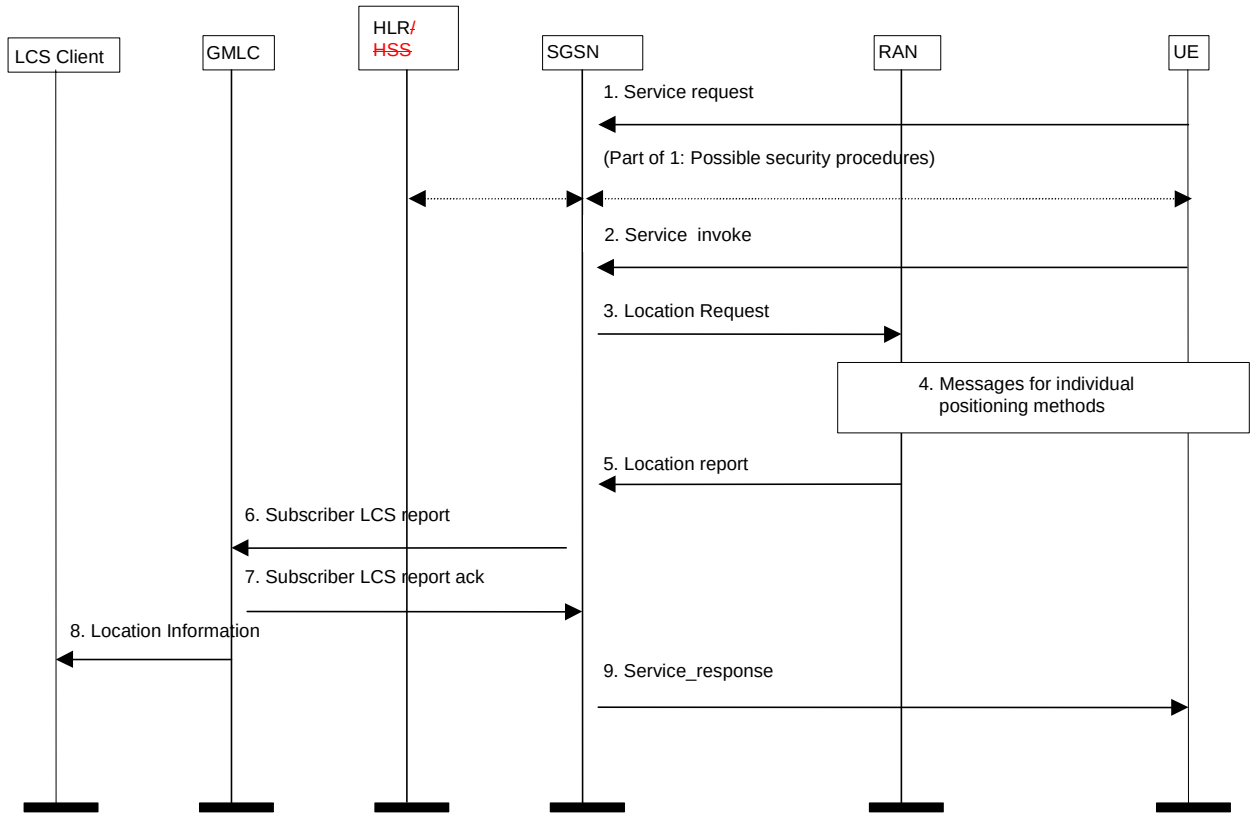


Figure 9.8: General Network Positioning for packet switched MO-LR

****** NEXT MODIFIED SECTION ******

10.1 HLR ~~and HSS~~

The HLR~~/HSS~~ holds LCS data for both UE subscribers and LMUs.

****** NEXT MODIFIED SECTION ******

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

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

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

Table 10.1: Logical States for each LCS Privacy Class

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

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

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

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 10.3: 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 10.4: 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 10.5: Temporary LCS data in the HLR

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

**** NEXT MODIFIED SECTION ****

10.2 VLR

The VLR contains the same LCS permanent data for each registered UE subscriber, as does the HLR~~/HSS~~. This data is downloaded to the VLR as part of the location update procedure between the VLR and HLR~~/HSS~~ for an UE subscriber.

**** NEXT MODIFIED SECTION ****

10.5.1 Interworking with the VLR supporting only pre-Rel'4 LCS

The VLR that supports only pre-Rel'4 LCS cannot handle the extended privacy control for call-related/call-unrelated class of the Rel'4 LCS. That is, the VLR cannot provide the extended call-related/call-unrelated class service to the user who subscribes to the Rel'4 LCS. Therefore HLR~~/HSS~~ does not send the subscriber data on call-related/call-unrelated class for users who subscribe to the call-related class of Rel'4 LCS to the VLR that supports only pre-Rel'4 LCS. The HLR~~/HSS~~ is notified whether the VLR supports Rel'4 LCS or not by an indication , which indicates all the LCS core network signalling capabilities the VLR supports, from the VLR during location update procedure. The following two LCS core network signalling capabilities are identified in the current version of this specification.

- LCS core network signalling capability set 1: R98 and R99 LCS (pre-Rel'4 LCS)
- LCS core network signalling capability set 2: Rel'4 or later LCS

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

3GPP TSG-SA WG2 Meeting #24
Madrid, Spain, 22nd –26th April 2002

Tdoc S2-021266

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **90** ⌘ **rev** **-** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Requestor identity in LCS client name
Source:	⌘	Ericsson, Nokia
Work item code:	⌘	LCS1
Date:	⌘	2002-04-10
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)

Reason for change:	⌘	In SA #15 Meeting the handling of Requestor Identity included in the CR 061 rev.1 was approved. The current handling of the functionality does not allow displaying the requestor identity to UE "pre rel-5 compliant", or in case the MSC/SGSN is pre rel5.
Summary of change:	⌘	The GMLC sends the requestor identity as separate information and, in addition, as part of the LCS client name. This allows the functionality to work in the case that, due to limited network/UE capability, the requestor id would not be shown to the UE user.
Consequences if not approved:	⌘	The requestor identity can be shown only to rel-5 compliant UE.

Clauses affected:	⌘	9.1.2.1, 9.1.6.1		
Other specs affected:	⌘	**X** Other core specifications	⌘	29.002, 24.080
		☐ Test specifications		
		☐ 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/3G_Specs/CRs.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 ******

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

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

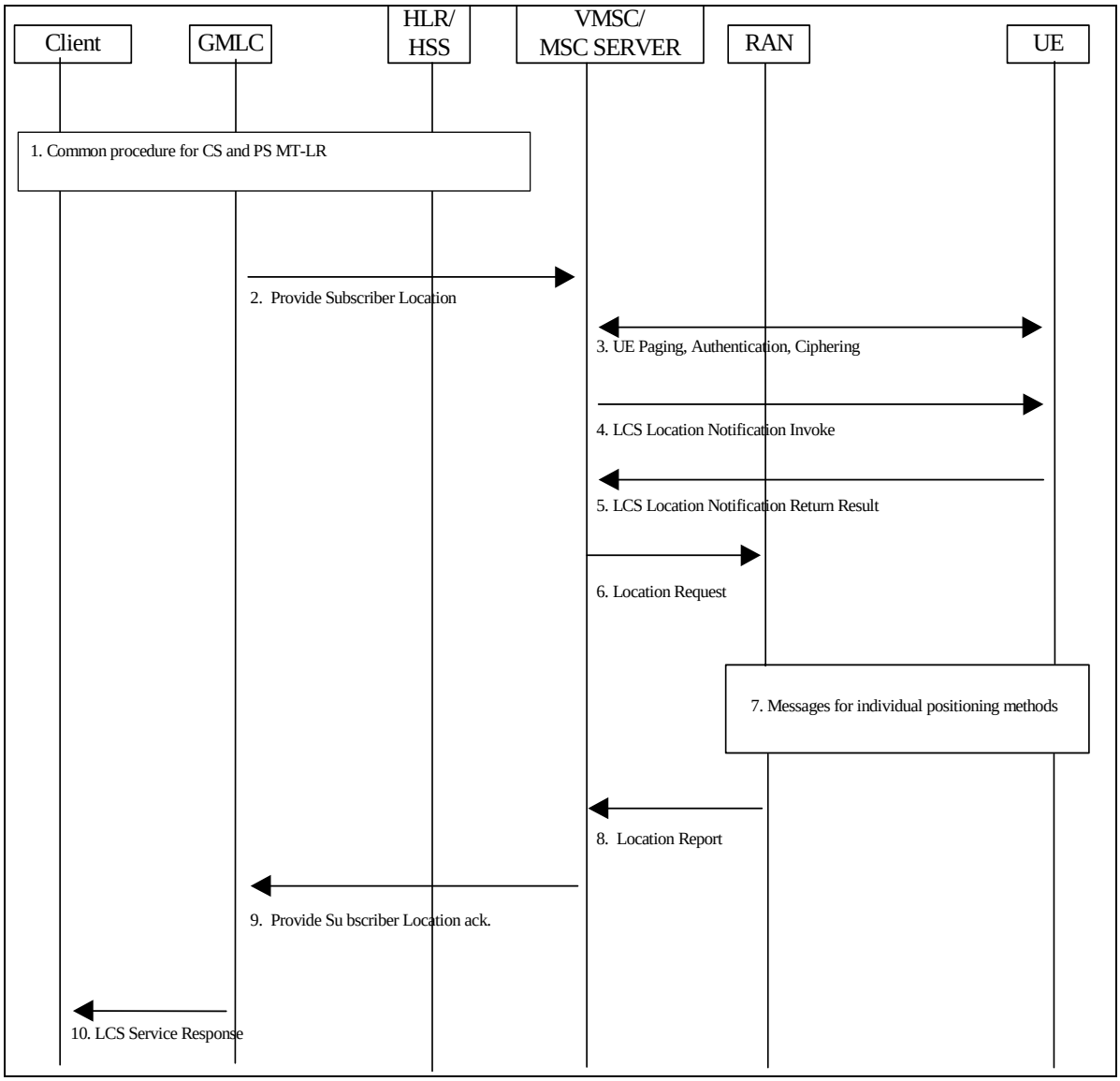


Figure 9.2: Network Positioning for a CS-MT-LR

9.1.2.1 Location Preparation Procedure

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

2) The GMLC sends a PROVIDE_ SUBSCRIBER _LOCATION message to the MSC/MSC server indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a call related location request, the message also carries the LCS client's called party number. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available). For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. Moreover the message may also carry the Service Type**.** If the HLR indicated that no codeword was stored for the UE user, the message may carry also the codeword received from the LCS client, to be displayed to the UE. 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 MODIFIED SECTION ******

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

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

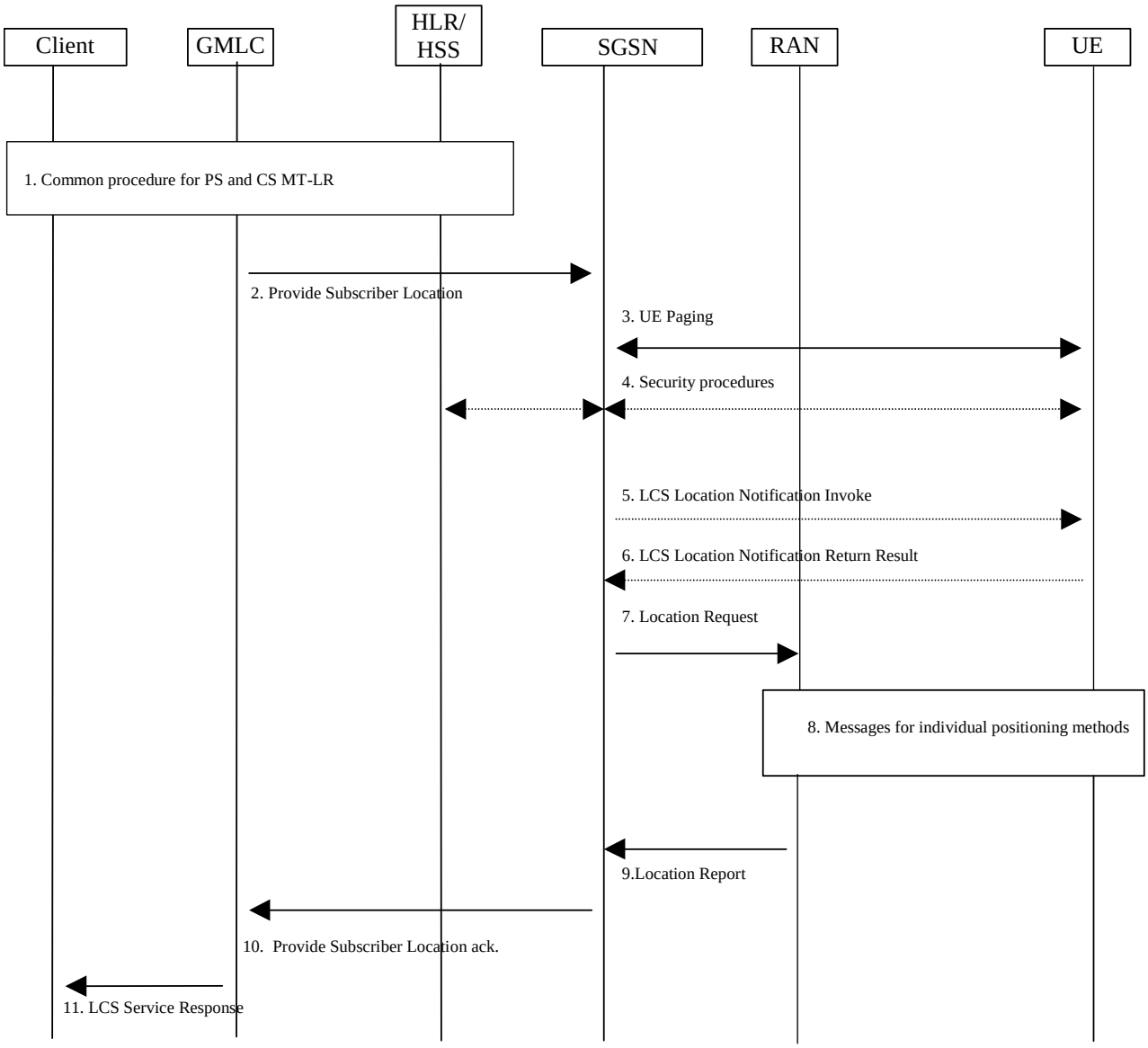


Figure 9.5: General Network Positioning for Packet Switched MT-LR

9.1.6.1 Location Preparation Procedure

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

2) GMLC sends a Provide Subscriber Location message to the SGSN indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a session related location request, the message also carries the APN-NI to which the user has established the session. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available), optionally the message may also carry the Service Type. If the HLR indicated that no codeword was stored for the UE user, the message may carry also the codeword received from the LCS client, to be displayed to the UE. 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

3GPP TSG-SA WG2 Meeting #24 ***Tdoc S2-021265***
Madrid, Spain, 22nd –26th April 2002 (Revised 2002/05/06)

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **89** ⌘ **rev** **1-** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Service type and codeword clarifications
Source:	⌘	Ericsson
Work item code:	⌘	LCS1
Date:	⌘	2002-04-04
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)

Reason for change:	⌘	The ~~text~~ table describing privacy check procedures based on service types needs to be updated according to the content of the ~~table~~ text ~~10.3~~ in chapter 9.5.3.5. ~~, to include the case in which the service type received from the GMLC is not in the list of service types allowed by the subscriber.~~ Moreover service type and codeword needs to be added in the definition chapter. In table 10.3 the status of some additional HLR data is missing. Finally, an editorial mistake in the text alignment in table 10.3 needs to be corrected to avoid misunderstanding.
Summary of change:	⌘	The ~~text~~ table describing privacy checks based on service types is corrected, ~~to take in account the case in which the service type received in the LCS request is not in the list of service types allowed by the subscriber~~. Service type and codeword are added in the definition chapter. Table 10.3 is updated to include the status of some additional data. Finally this CR corrects an editorial mistake in the text alignment in table 10.3 and allows the subscriber to have an empty list
Consequences if not approved:	⌘	~~One case included in table 10.3 is not described by corresponding text.~~ Not clear handling of service type privacy checking. Missing definition. Status of additional data missing.

Clauses affected:	⌘	3.1, ~~9.5.3.5~~, 10.1.1 (Table 10.3)		
Other specs affected:	⌘	**X** Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	29.002
Other comments:	⌘	The changes in table 10.3 are highlighted in yellow colour, due to some limitations in Track Changes tool.		

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Below is a brief summary:

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

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

**** FIRST MODIFIED SECTION ****

3.1 Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Target UE: UE being positioned

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

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

**** NEXT MODIFIED SECTION ****

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

****Unchanged text removed for clarity ****

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~~	~~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~~

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

3GPP TSG SA WG2 Meeting # 24 **S2-021242**
Madrid, Spain, 22nd - 26th April 2002

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **CRNum** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Introduction of the GMLC - GMLC interface: – Clause: 9: General Network Positioning Procedures
Source:	⌘	Orange
Work item code:	⌘	TBN (S20020902 - Approved)
Date:	⌘	
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)*

Reason for change:	⌘	Definition of the Stage 2 LCS information flows between GMLCs across the inter-GMLC interface, in accordance with LCS Work Item.
Summary of change:	⌘	Clause 9: New LCS information flow diagram and descriptive text added for Mobile Terminated (MT) location requests using the inter-GMLC interface.
Consequences if not approved:	⌘	Stage 2 description of GMLC – GMLC interface will be incomplete

Clauses affected:	⌘			
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3GPP TS23.271 v5.1.0

<<<First changed clause>>>

9 General Network Positioning Procedures

The generic network positioning procedure of providing the location information of an UE subscriber can be partitioned into the following procedures.

Location Preparation Procedure

This generic procedure is concerned with verifying the privacy restrictions of the UE subscriber, reserving network resources, communicating with the UE to be located and determining the positioning method to be used for locating the UE subscriber based on the requested QoS and the UE and network capabilities.

Positioning Measurement Establishment Procedure

This procedure is concerned with performing measurements by involving the necessary network and/or UE resources. Depending on the positioning method to be used for locating the UE the internals of this procedure can be positioning method dependent. The procedure is completed with the end of the positioning measurements.

Location Calculation and Release Procedure

This generic procedure is initiated after the measurements are completed and is concerned with calculating the location of the UE and releasing all network and/or UE resources involved in the positioning.

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

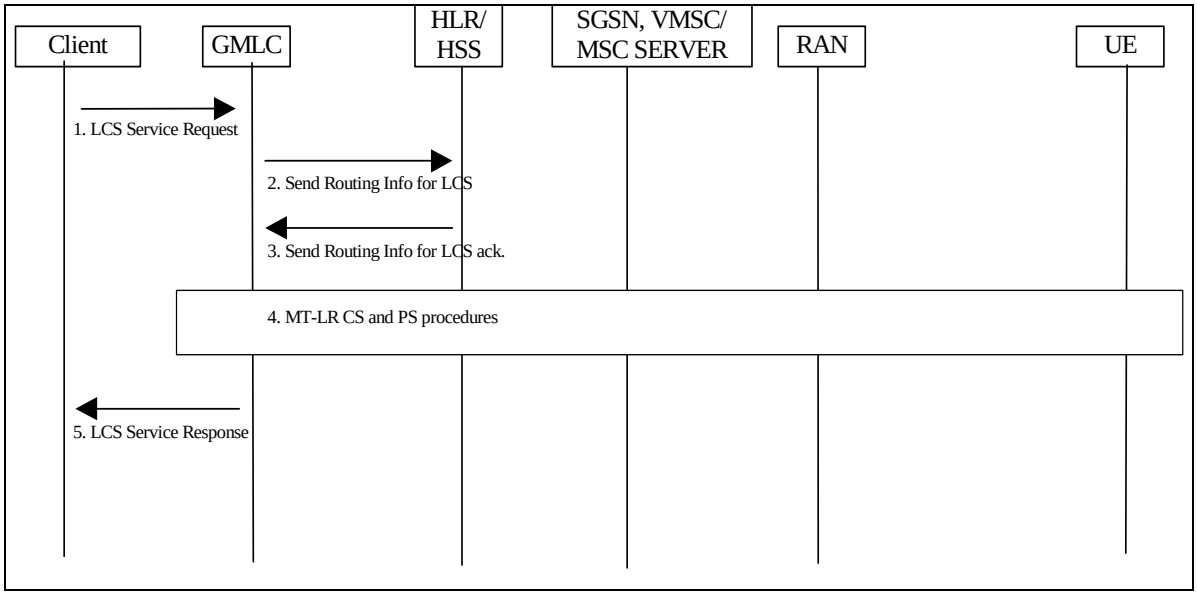

Figure 9.1.1: General Network Positioning for a MT-LR

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 or session related location request, the GMLC obtains and authenticates the called party number of the LCS client. If location is required for more than one UE, or if periodic location is requested, the steps following below may

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

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

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

3) The HLR/HSS verifies that the calling party SCCP address of the GMLC corresponds to a known GSM/UMTS network element that is authorised 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 may prioritise 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.

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.

9.1.1.1 GMLC MT-LR routing procedure for a roaming UE using the inter-GMLC interface and with R-GMLC not located in the HPLMN

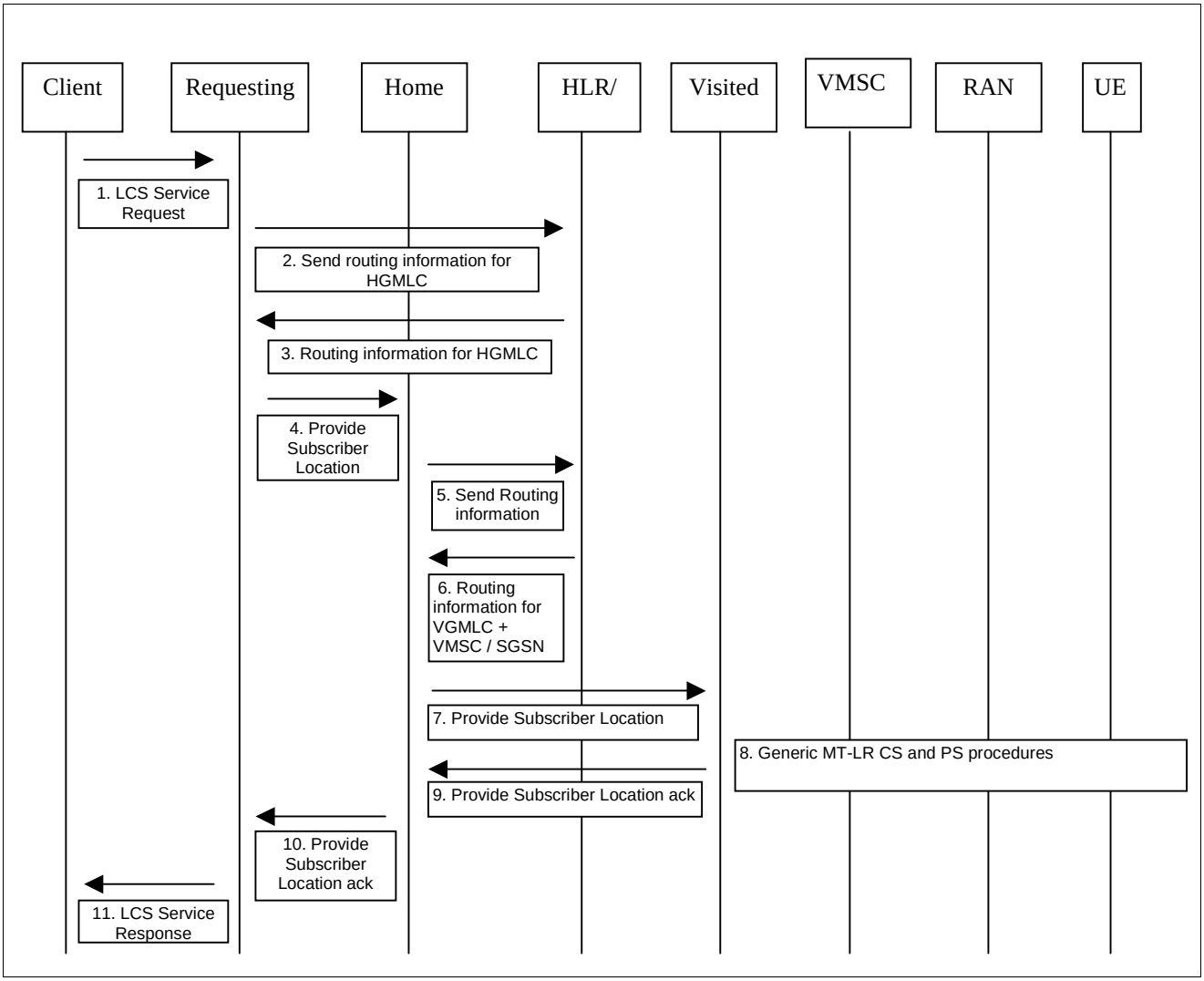

Figure 9.1.2: General Network Positioning for a roaming UE using the inter-GMLC interface

1) Common PS and CS MT-LR procedure as described 9.1.1 sub-clause 1). In this case the GMLC is referred to as the requesting GMLC (R-GMLC)

2) Requesting GMLC (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, PDP address or MSISDN of this UE. This is to obtain the UE's home GMLC (H-GMLC) address for further routing enquiries and privacy checking.

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 R-GMLC corresponds to a known GSM/UMTS network element, not in the HPLMN, that is authorised to request UE location information. The HLR/HSS then returns the H-GMLC address.

4) The R-GMLC sends a Provide_Subscriber_Location message to the H-GMLC via the inter-GMLC interface for Privacy checking and routing to the V-GMLC. If required, a request for the location co-ordinates to be transformed into some local geographic system may be added to this message.

5) H-GMLC requests routing information from the HLR/HSS for both the V-GMLC and VMSC/SGSN.

6) The HLR/HSS verifies that the calling party SCCP address of the H-GMLC corresponds to a known GSM/UMTS network element, in the HPLMN, that is authorised to request UE location information. The HLR/HSS then returns the current V-GMLC address together with the VMSC/SGSN address and whichever of the IMSI and MSISDN was not provided in step (5) for the particular UE.

Note: the HLR may prioritise between the MSC/VLR or SGSN address sent to the H-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.

7) Following privacy checking the H-GMLC send a Provide_Subscriber_Location message to the V-GMLC via the inter-GMLC interface. If required, a request for the location co-ordinates to be transformed into some local geographic system may be added to this message.

8) Generic MT-LR CS and PS procedures as described in 9.1.1.

9) The V-GMLC sends the Provide-Subscriber_Location_ack. If the R-GMLC has requested it, the V-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/VLR server into some local geographic system, or this conversion may be performed by the H-GMLC.

10) The H-GMLC forwards the Provide_Subscriber_Location_ack to the R-GMLC.

11) 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/VLR server into some local geographic system. The R-GMLC may record billing for both the LCS client and inter-network revenue charge from the VMSC/SGSN network.

<<<End of changes >>>

3GPP TSG-SA-WG2 Meeting #24 ***Tdoc: S2-021216***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.271 CR 088** ⌘ rev **-** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Deleting version number of Mobile Location Protocol Specification from reference
Source:	⌘	NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-15
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(essential 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)

Reason for change:	⌘	Location Interoperability Forum (LIF) prefers that 3GPP always refer to the latest version of Mobile Location Protocol Specification that is made by LIF and ask 3GPP to omit specific version numbers from reference.
Summary of change:	⌘	Version number of Mobile Location Protocol Specification from reference is deleted
Consequences if not approved:	⌘	We need to update the version number of Mobile Location Protocol Specification whenever LIF update the version of Mobile Location Protocol specification.

Clauses affected:	⌘	2.1
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

-

2.1 Normative references

[1] 3G TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".

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

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

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

[5] (void)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3GPP TSG-SA-WG2 Meeting #24 ***Tdoc: S2-021204***
Madrid, Spain, 22nd – 26th April 2002

CR-Form-v3

CHANGE REQUEST

⌘ **23.271** **CR** **083** ⌘ rev **-** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Handling of Location request without Codeword in GMLC
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	2002-APR-17
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(essential 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)

Reason for change:	⌘	In the current TS23.271 v5.2.0,. there is a sentence as below. *"if the codeword functionality is supported, the GMLC shall reject the LCS service request in case the LCS client type is "value added" and the codeword was not received."* However, in Chapter 6.4.2 of TS22.071 v5.1.0, there is a sentence shown below. *" It should be possible for a Target UE subscriber to enable and disable codeword checking."* As clearly stated in TS22.071, it is target UE subscriber's choice whether he/she wants to use the codeword functionality or not. Therefore, GMLC shall not reject LCS service requests even if the LCS client type is "value added" and the codeword is not received.
Summary of change:	⌘	GMLC does not reject LCS service requests even if the LCS client type is "value added" and the codeword is not received.
Consequences if not approved:	⌘	The ambiguousness between stage 1 and stage 2 specifcaitions remains.

Clauses affected:	⌘	9.1.1		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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

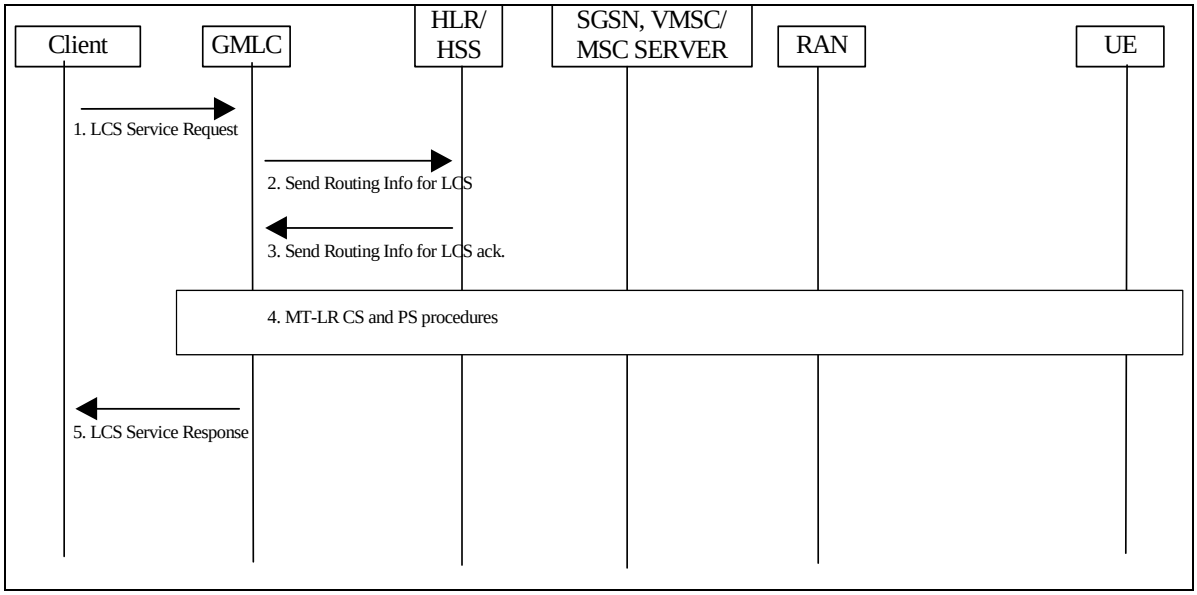

Figure 9.1: General Network Positioning for a MT-LR

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 codeword functionality is supported, the GMLC shall reject the LCS service request in case the LCS client type is "value added" and the codeword was not received.~~
   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 codeword functionality is not supported, 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 the GMLC supports the codeword functionality, steps 2 and 3 shall not be skipped. The SEND_ROUTING_INFO_FOR_LCS message may carry also the Codeword received by the LCS client in the LCS Service request. For a LCS client type different from "value added" an indication may be sent to the HLR, in order to inform the HLR 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 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.

The HLR may check if the codeword received in SEND_ROUTING_INFO_FOR_LCS message matches one of the codewords stored for the target subscriber. If it doesn't match, then the HLR shall return an error message to the GMLC. If no codeword is stored in the HLR for the target subscriber, the request shall not be rejected by the HLR and shall send to the GMLC the related indication in SEND_ROUTING_INFO_FOR_LCS_ack message. If the HLR receives the indication from the GMLC that the codeword is not applicable, the codeword check is not performed in the HLR.

Moreover, if the HLR supports the Enhanced User Privacy, the HLR shall check if the VMSC and/or the SGSN under which the target subscriber is located supports the enhanced user privacy mechanisms (Service type and Requestor), by checking the supported LCS capabilities set. Only the address of a serving node that supports the enhanced user privacy mechanism will be returned to GMLC. If none of the VMSC or SGSN supports the Enhanced User Privacy, then the HLR shall send an error indication to the GMLC.

NOTE: This handling allows the HPLMN to have the control about the fact that the VPLMN supports the EUP 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.

3GPP TSG-SA2#24 **SA-021183**
Madrid, Spain, 22-26 April 2002

CR-Form-v5

CHANGE REQUEST

⌘ **03.71** **CR** **42** ⌘ **rev** **-** ⌘ Current version: **8.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	Correction of timing when SMLC enters LOCATION state.
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	22 April 2002
Category:	⌘	**A**
Release:	⌘	R99

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

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

Reason for change:	⌘	SMLC should enter the LOCATION state once it has received a location request from the BSC and not after it has started its positioning measurements.
Summary of change:	⌘	Stated that SMLC enters the LOCATION state once it has received an location request form the BSC.
Consequences if not approved:	⌘	We could have a situation were an SMLC computes a positioning estimate without ever been in LOCATION state. This situation could happen if SMLC has not to request any measurements from the network (i.e. TA measurements with TA already contained in the positioning request from the BSC). Furthermore, there would not be consistency with section 7.4.1.2

Clauses affected:	⌘	7.4.2.1
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

7.4 State Description for the SMLC

7.4.1 SMLC States

7.4.1.1 NULL State

This is a conceptual rather than actual state in which a certain location request from a particular VMSC or BSC either has not yet been received or has been completed.

7.4.1.2 LOCATION State

This state exists after the SMLC has received a location request from a VMSC or BSC and persists while the SMLC is obtaining position measurements for a particular positioning method until such time as positioning measurements have been received and a location estimate has been computed and returned to the VMSC or BSC.

When sufficient positioning measurement results have been received, the SMLC either evaluates them, if they include an already computed location estimate, or uses them to compute a location estimate. The SMLC then has the option of either reinitiating another positioning attempt, if the location estimate did not satisfy the required QoS, or returning the location estimate to the VMSC or BSC.

7.4.2 State Functionality

7.4.2.1 State Transitions

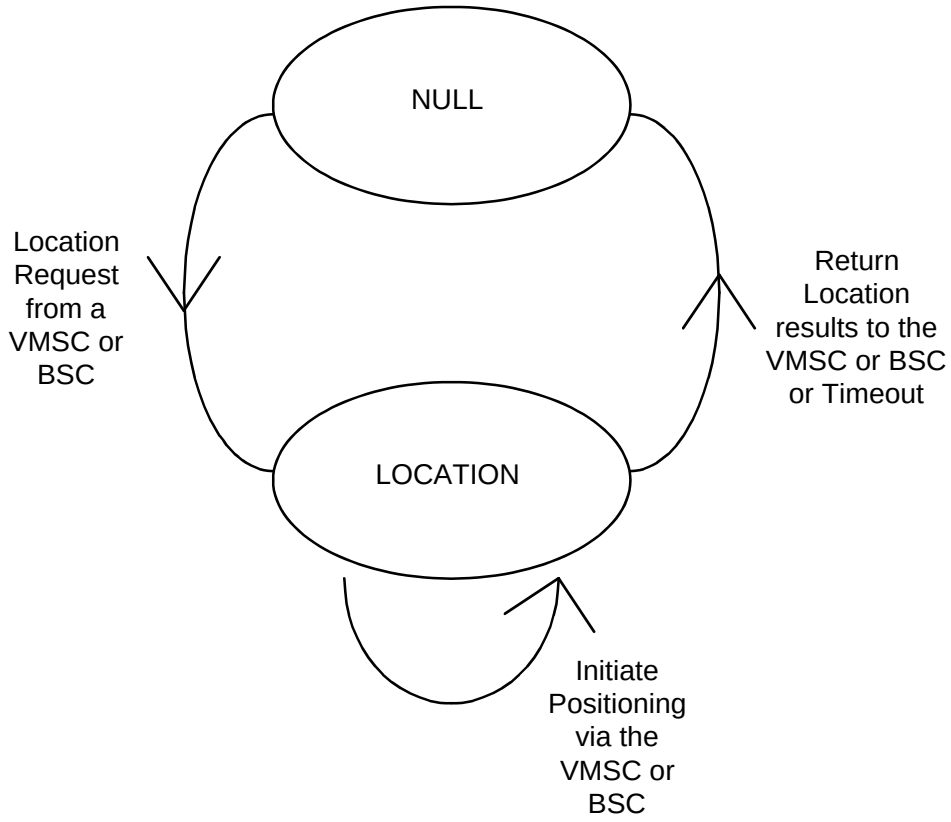

Figure 24: State Transitions in the SMLC

Moving from NULL to LOCATION state:

After a location request is received from the VMSC or BSC, the SMLC enters the LOCATION state. It then chooses a positioning method and initiates the appropriate position measurements. ~~It then enters the LOCATION state~~.

Moving from LOCATION to NULL state:

When the SMLC has obtained a location estimate that best meets the requested QoS parameters, it returns this to the VMSC or BSC and reenters the NULL state.

7.4.2.2 LOCATION Timer Function

The SMLC runs a timer while in the LOCATION state to limit the total amount of time that positioning can be active. This timer should be related to any response time indicated in the location request QoS parameters. If the timer expires before a final location estimate has been produced, the SMLC either returns the best existing location estimate to the VMSC (e.g. an estimate based on the current cell ID) or returns a failure indication. It then reenters the NULL state.

3GPP TSG-SA2#24 **SA-021182**
Madrid, Spain, 22-26 April 2002

CR-Form-v5

CHANGE REQUEST

⌘ **03.71** **CR** **41** ⌘ **rev** **-** ⌘ Current version: **7.8.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	Correction of timing when SMLC enters LOCATION state.
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	22 April 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)

Reason for change:	⌘	SMLC should enter the LOCATION state once it has received a location request from the BSC and not after it has started its positioning measurements.
Summary of change:	⌘	Stated that SMLC enters the LOCATION state once it has received an location request form the BSC.
Consequences if not approved:	⌘	We could have a situation were an SMLC computes a positioning estimate without ever been in LOCATION state. This situation could happen if SMLC has not to request any measurements from the network (i.e. TA measurements with TA already contained in the positioning request from the BSC). Furthermore, there would not be consistency with section 7.4.1.2

Clauses affected:	⌘	7.4.2.1
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

7.4 State Description for the SMLC

7.4.1 SMLC States

7.4.1.1 NULL State

This is a conceptual rather than actual state in which a certain location request from a particular VMSC or BSC either has not yet been received or has been completed.

7.4.1.2 LOCATION State

This state exists after the SMLC has received a location request from a VMSC or BSC and persists while the SMLC is obtaining position measurements for a particular positioning method until such time as positioning measurements have been received and a location estimate has been computed and returned to the VMSC or BSC.

When sufficient positioning measurement results have been received, the SMLC either evaluates them, if they include an already computed location estimate, or uses them to compute a location estimate. The SMLC then has the option of either reinitiating another positioning attempt, if the location estimate did not satisfy the required QoS, or returning the location estimate to the VMSC or BSC.

7.4.2 State Functionality

7.4.2.1 State Transitions

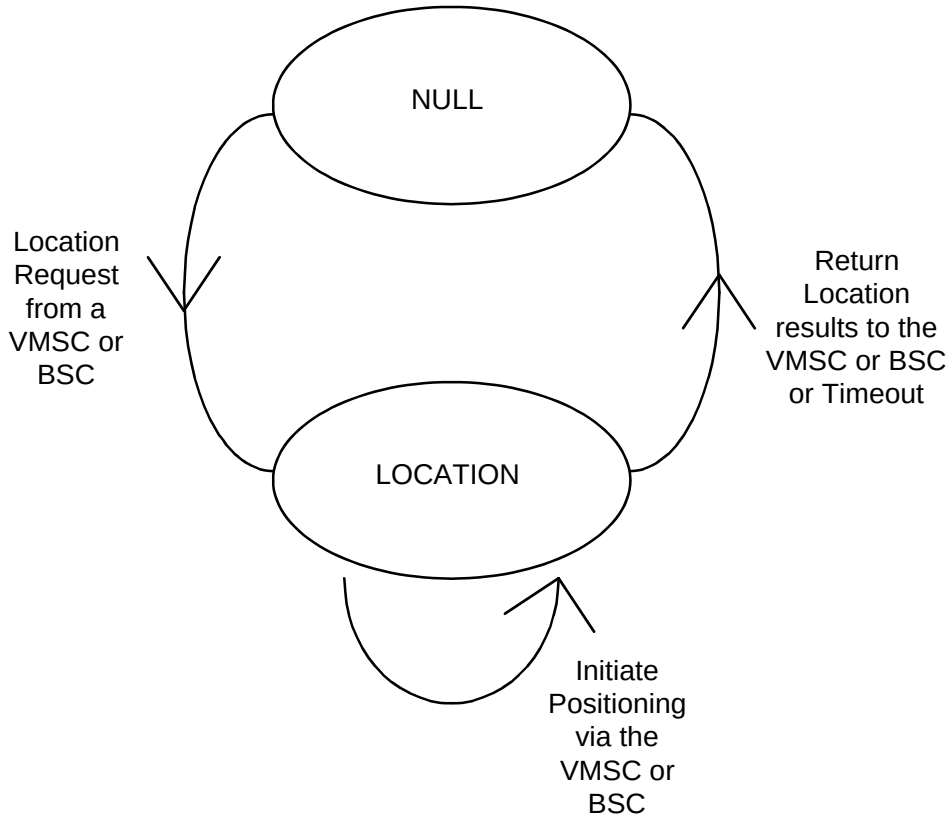

Figure 24: State Transitions in the SMLC

Moving from NULL to LOCATION state:

After a location request is received from the VMSC or BSC, the SMLC enters the LOCATION state. It then chooses a positioning method and initiates the appropriate position measurements. ~~It then enters the LOCATION state.~~

Moving from LOCATION to NULL state:

When the SMLC has obtained a location estimate that best meets the requested QoS parameters, it returns this to the VMSC or BSC and reenters the NULL state.

7.4.2.2 LOCATION Timer Function

The SMLC runs a timer while in the LOCATION state to limit the total amount of time that positioning can be active. This timer should be related to any response time indicated in the location request QoS parameters. If the timer expires before a final location estimate has been produced, the SMLC either returns the best existing location estimate to the VMSC (e.g. an estimate based on the current cell ID) or returns a failure indication. It then reenters the NULL state.

3GPP TSG SA WG2 Meeting # 24 **S2-021157**
Madrid, Spain, 22nd - 26th April 2002

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **81** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 9: General Network Positioning Procedures
Source:	⌘	Vodafone
Work item code:	⌘	TBN (S20020902 - Approved)
Date:	⌘	
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)*

Reason for change:	⌘	Definition of the Stage 2 LCS information flows between GMLCs across the Lr interface, in accordance with LCS Work Item.
Summary of change:	⌘	Clause 9: New LCS information flow diagram and descriptive text added for Mobile Terminated (MT) location requests using the inter-GMLC Lr interface.
Consequences if not approved:	⌘	Stage 2 description of GMLC – GMLC Lr interface will be incomplete

Clauses affected:	⌘	
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3GPP TS23.271 v5.1.0

<<<First changed clause>>>

9 General Network Positioning Procedures

The generic network positioning procedure of providing the location information of an UE subscriber can be partitioned into the following procedures.

Location Preparation Procedure

This generic procedure is concerned with verifying the privacy restrictions of the UE subscriber, reserving network resources, communicating with the UE to be located and determining the positioning method to be used for locating the UE subscriber based on the requested QoS and the UE and network capabilities.

Positioning Measurement Establishment Procedure

This procedure is concerned with performing measurements by involving the necessary network and/or UE resources. Depending on the positioning method to be used for locating the UE the internals of this procedure can be positioning method dependent. The procedure is completed with the end of the positioning measurements.

Location Calculation and Release Procedure

This generic procedure is initiated after the measurements are completed and is concerned with calculating the location of the UE and releasing all network and/or UE resources involved in the positioning.

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

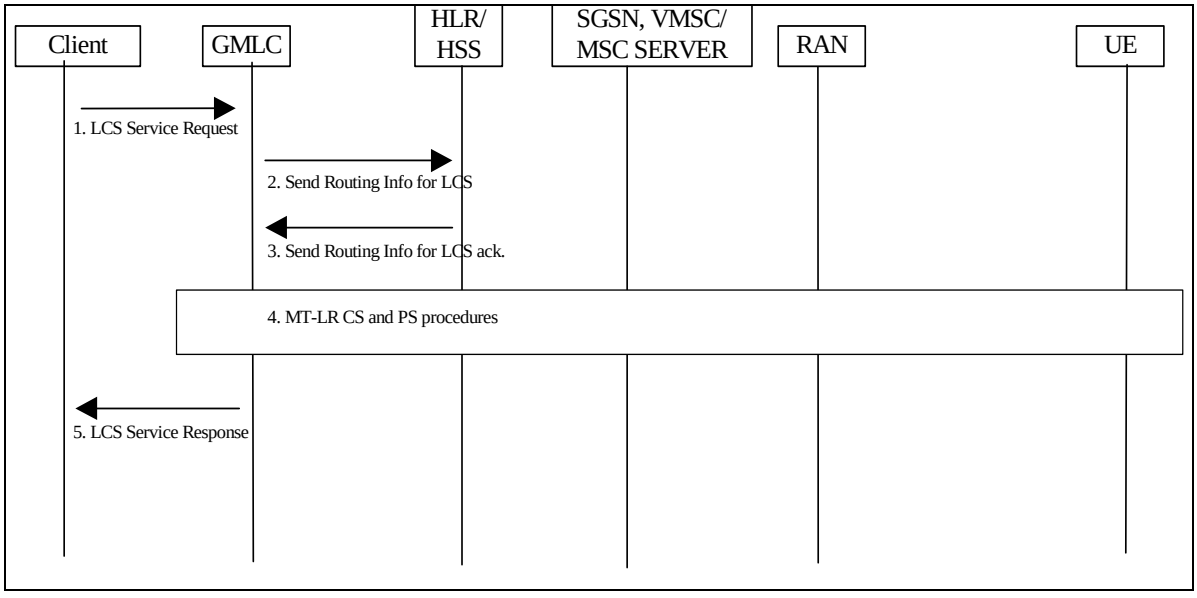

Figure 9.1-1: General Network Positioning for a MT-LR

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 or session related location request, the GMLC obtains and authenticates the called party number of the LCS client. If location is required for more than one UE, or if periodic location is requested, the steps following below may

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

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

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

3) The HLR/HSS verifies that the calling party SCCP address of the GMLC corresponds to a known GSM/UMTS network element that is authorised 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 may prioritise 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.

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.

9.1.1.1 GMLC MT-LR routing procedure for a roaming UE using the Lr interface and with the R-GMLC not located in the HPLMN.

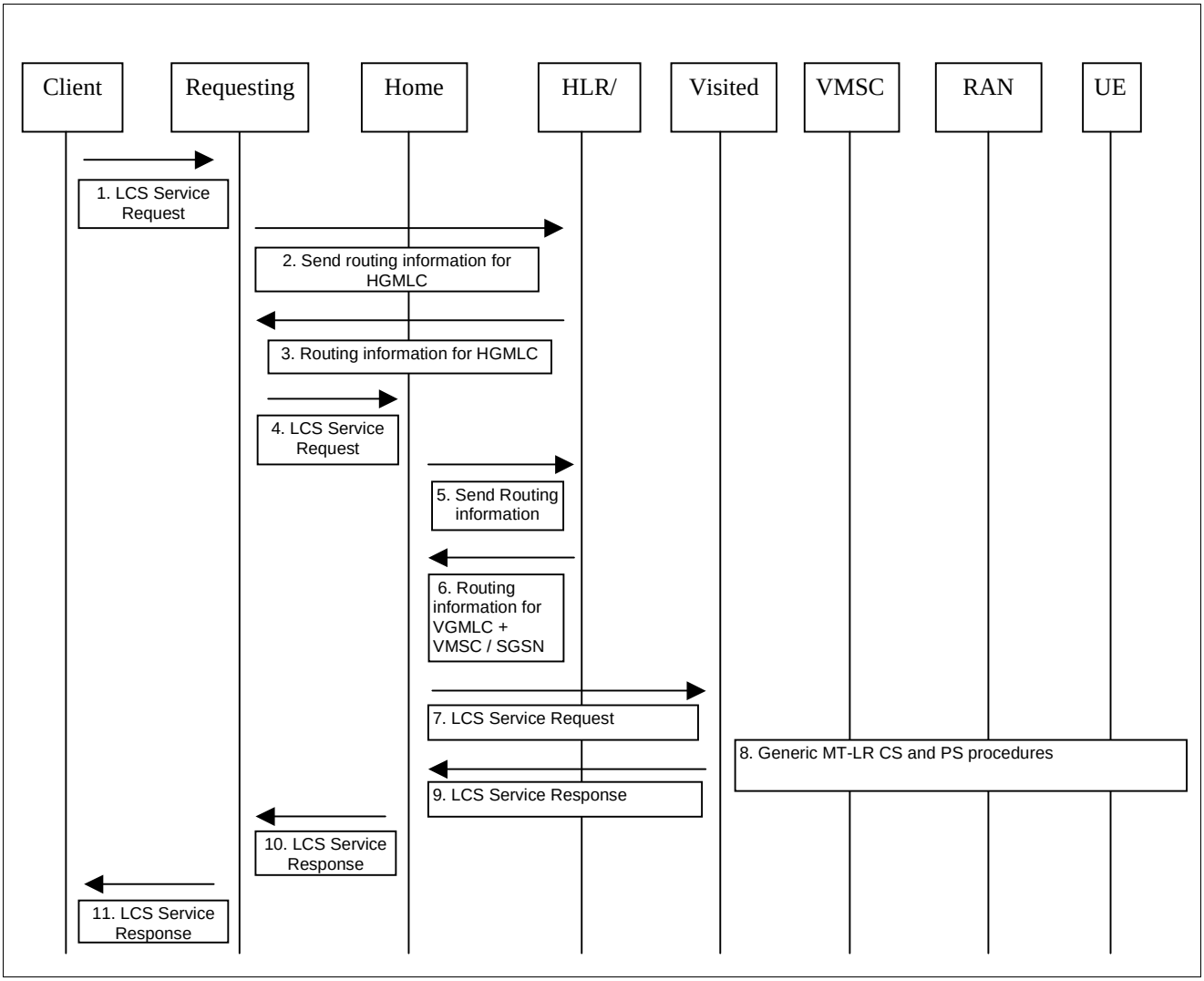

Figure 9.1-2: General Network Positioning for a roaming UE using the Lr interface

1) Common PS and CS MT-LR procedure as described 9.1.1 sub-clause 1). In this case the GMLC is referred to as the requesting GMLC (R-GMLC).

2) If Requesting GMLC (R-GMLC) already knows both the target UE's home GMLC (H-GMLC) address and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), this step and step 3 may be skipped. Otherwise, the ~~Requesting GMLC (~~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~~, PDP address~~ or MSISDN of this UE. This is to obtain the UE's ~~home GMLC (~~H-GMLC~~)~~ address for further routing enquiries and privacy checking.

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

<< In order to align the above procedure with the current procedure in 9.1.1(2), I added the sentence.>>

<<PDP address cannot be transferd by using the SEND_ROUTING_INFO_FOR_LCS message according to the current TS29.002>>

3) The HLR/HSS verifies that the calling party SCCP address of the R-GMLC corresponds to a known GSM/UMTS network element, not in the HPLMN, that is authorised to request UE location information. The HLR/HSS then returns the H-GMLC address and whichever of the IMSI and MSISDN was not provided in step (2) for the particular UE..

4) The R-GMLC forwards the authenticated LCS service request directly to the H-GMLC via the Lr interface for privacy checking and routing to the VGMLC. If required, a request for the location co-ordinates to be transformed into some local geographic system may be added to this message. If the R-GMLC receives the VMSC and/or SGSN address instead of the H-GMLC address, the R-GMLC performs the generic MT-LR CS and PS procedures as described in 9.1.

<<I added the above sentence in order to explain the procedure for backword compatibility>>

<<Could you tell me the meaning of " the authenticated LCS service request"? Do you suggest that the requesting GMLC performs the authenticaion of requesting LCS Client? >>

5) H-GMLC requests routing information from the HLR/HSS for both the V-GMLC and VMSC/SGSN after privacy checking.~~.~~

<<I think that the privacy check should be performed before the H-GMLC access the HLR/HSS so that redundant signalling between H-GMLC and HSS/HLR is reduced>>

6) The HLR/HSS verifies that the calling party SCCP address of the H-GMLC corresponds to a known GSM/UMTS network element, in the HPLMN, that is authorised to request UE location information. The HLR/HSS then returns the current VGMLC address together with the VMSC and/or SGSN address, and whichever of the IMSI and MSISDN was not provided in step (5) for the particular UE. If the HLR/HSS does not know the current V-GMLC address, the HLR/HSS returns only the VGMLC and/or SGSN address and whichever of the IMSI and MSISDN was not provided in step (5) for the particular UE.

<<I added the above sentence in order to explain the procedure for backword compatibility>>

Note: The HLR may prioritise between the MSC/VLR or SGSN address sent to the H-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.

7) ~~Following privacy checking t~~The H-GMLC sends the LCS service request directly to the V-GMLC via the Lr interface. If required, a request for the location co-ordinates to be transformed into some local geographic system may be added to this message. If the H-GMLC does not receive the current V-GMLC address, the H-GMLC performs the generic MT-LR CS and PS procedures as described in 9.1. (i.e. the H-MLC send a PROVIDE_SUBSCRIBER_LOCATION message to MSC or SGSN indicated by HLR/HSS)

8) Generic MT-LR CS and PS procedures as described in 9.1~~.1~~.

9) The V-GMLC sends the LCS Service Response to the H-GMLC. If the R-GMLC has requested it, the V-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system, or this conversion may be performed by the H-GMLC.

10) The H-GMLC forwards the LCS Service Response to the R-GMLC.

11) 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 R-GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN / VMSC network.

<<<End of changes >>>

3GPP TSG SA WG2 Meeting # 24 **S2-021156**
Madrid, Spain, 22nd - 26th April 2002

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **80** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clauses: 6 & 8: LCS Architecture and General Network Procedures
Source:	⌘	Vodafone
Work item code:	⌘	TBN (S20020902 - Approved)
Date:	⌘	
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)*

Reason for change:	⌘	Stage 2 description of the GMLC – GMLC Lr (roaming) interface, LCS architecture and general procedures, in accordance with LCS Work Item.
Summary of change:	⌘	Clauses 6 & 8: New diagrams and explanatory text added to include optional use of GMLC – GMLC Lr interface.
Consequences if not approved:	⌘	Stage 2 description of GMLC – GMLC interface will be incomplete

Clauses affected:	⌘			
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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

3GPP TS23.271 v5.1.0

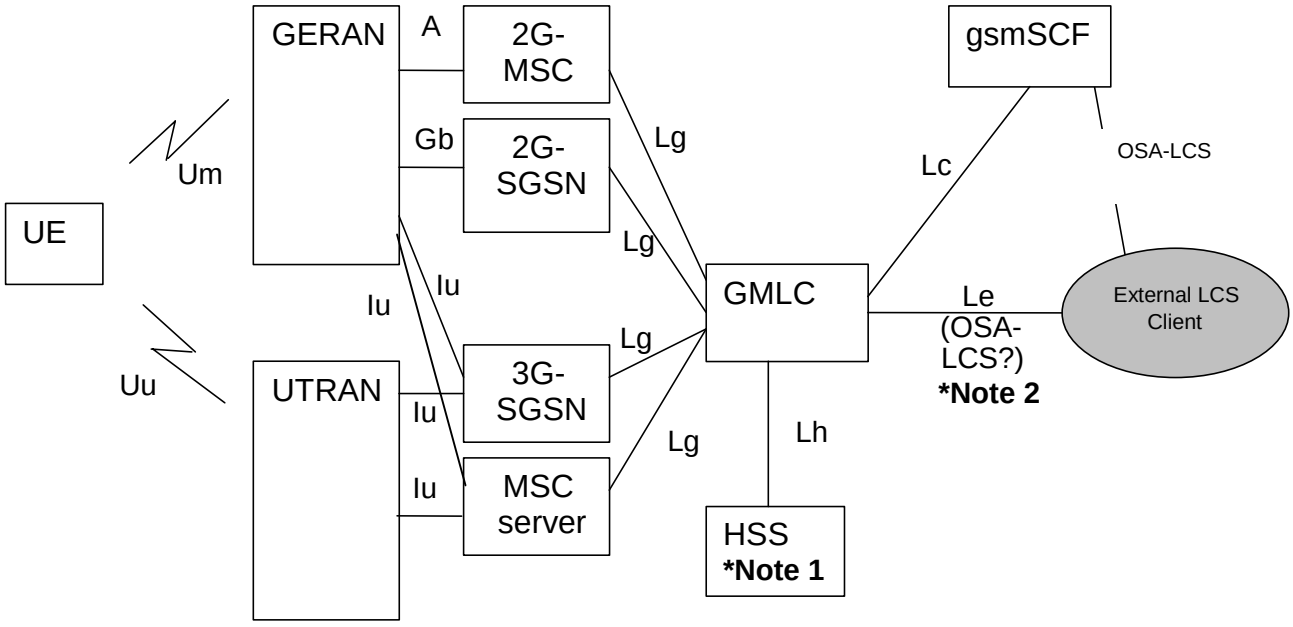
<<<First changed clause>>>

6 LCS Architecture

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

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

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



NOTE 1: HSS includes both 2G-HLR and 3G-HLR functionality. LCS is included in the overall network architecture in TS 23.002 [20].
NOTE 2: The Le interface is FFS. S1 agreed that LCS shall support OSA-API.

Figure 6.1-1: General arrangement of LCS

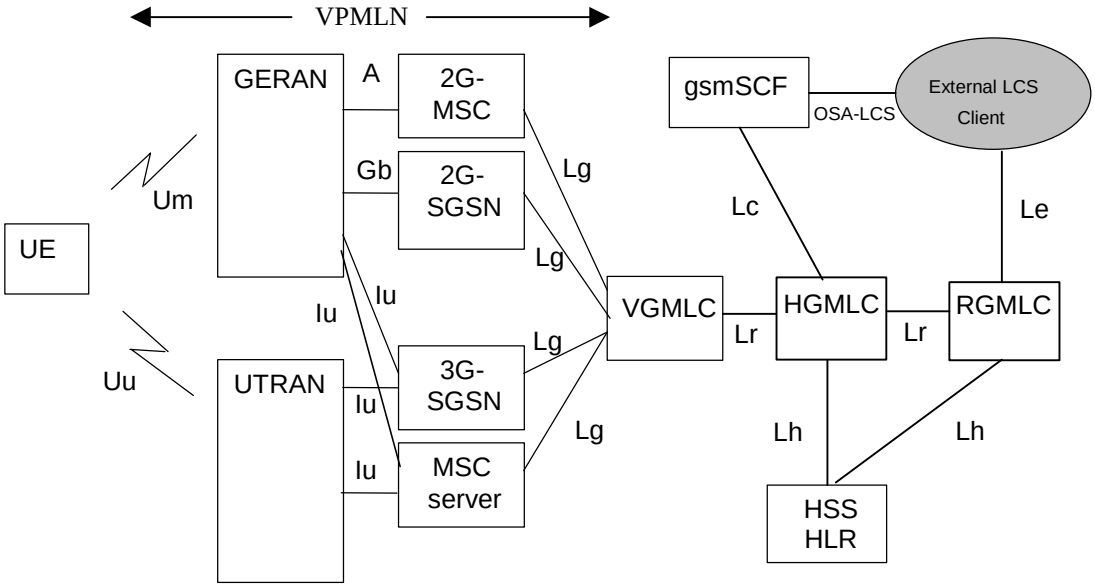


Figure 6.1-2: General arrangement of LCS with inter-GMLC [Lr] interface

6.1 Schematic functional description of LCS operations

The allocation of LCS functional blocks to the Client, LCS server, Core Network, Access Network and UE is based on the schematic functional description below. The detailed functions and interactions are specified later in the present document and in TS 25.305 [1] for UTRAN, in TS 43.059 [16] for GERAN and in corresponding Stage 3 specifications.

The operation begins with a LCS Client requesting location information for a UE from the LCS server. The LCS server will pass the request to the LCS functional entities in the core network. The LCS functional entities in the core network shall then:

- verify that the LCS Client is authorised to request the location of the UE or subscriber;
- verify that LCS is supported by the UE;
- establish whether it is allowed to locate the UE or subscriber, for privacy or other reasons;
- establish which network element in the Access Network should receive the Location request;
- request the Access Network (via the A, Gb or Iu interface) to provide location information for an identified UE, with indicated QoS;
- receive information about the location of the UE from the Access Network and forward it to the Client;
- send appropriate accounting information to an accounting function.

The Access Network LCS functional entities shall determine the position of the target UE according to TS 25.305 [1] for UTRAN and TS 43.059 [16] for GERAN.

6.3.3 Gateway Mobile Location Center, GMLC

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

The GMLC is the first node an external LCS client accesses in a GSM PLMN (i.e. the Le reference point is supported by the GMLC). The GMLC may request routing information from the HLR or HSS via the Lh interface. After performing registration authorization, it sends positioning requests to either the VMSC, SGSN or MSC Server and

receives final location estimates from the corresponding entity via Lg interface. Optionally, location information may be communicated between GMLCs, located in the same or different PLMNs, via the Lr [?] GMLC to GMLC interface.

<<<Next changed clause>>>

8 General network location procedures

8.1 State description for GMLC

8.1.1 GMLC states

8.1.1.1 NULL State

In the NULL state, a particular location request from some LCS client either has not been received yet or has already been completed. After a location request is received from a LCS client, the GMLC remains in the NULL state while the identity of the client and nature of its location request are verified. While the NULL state exists conceptually, it need not be represented explicitly in the GMLC.

8.1.1.2 INTERROGATION State

In this state, the GMLC has sent an interrogation to the home HLR/HSS of the UE to be located and is awaiting a response giving one or several of the following addresses:the VMSC, MSC Server, SGSN address and IMSI for this UE.

8.1.1.3 LOCATION State

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

8.1.2 State functionality

8.1.2.1 State Transitions

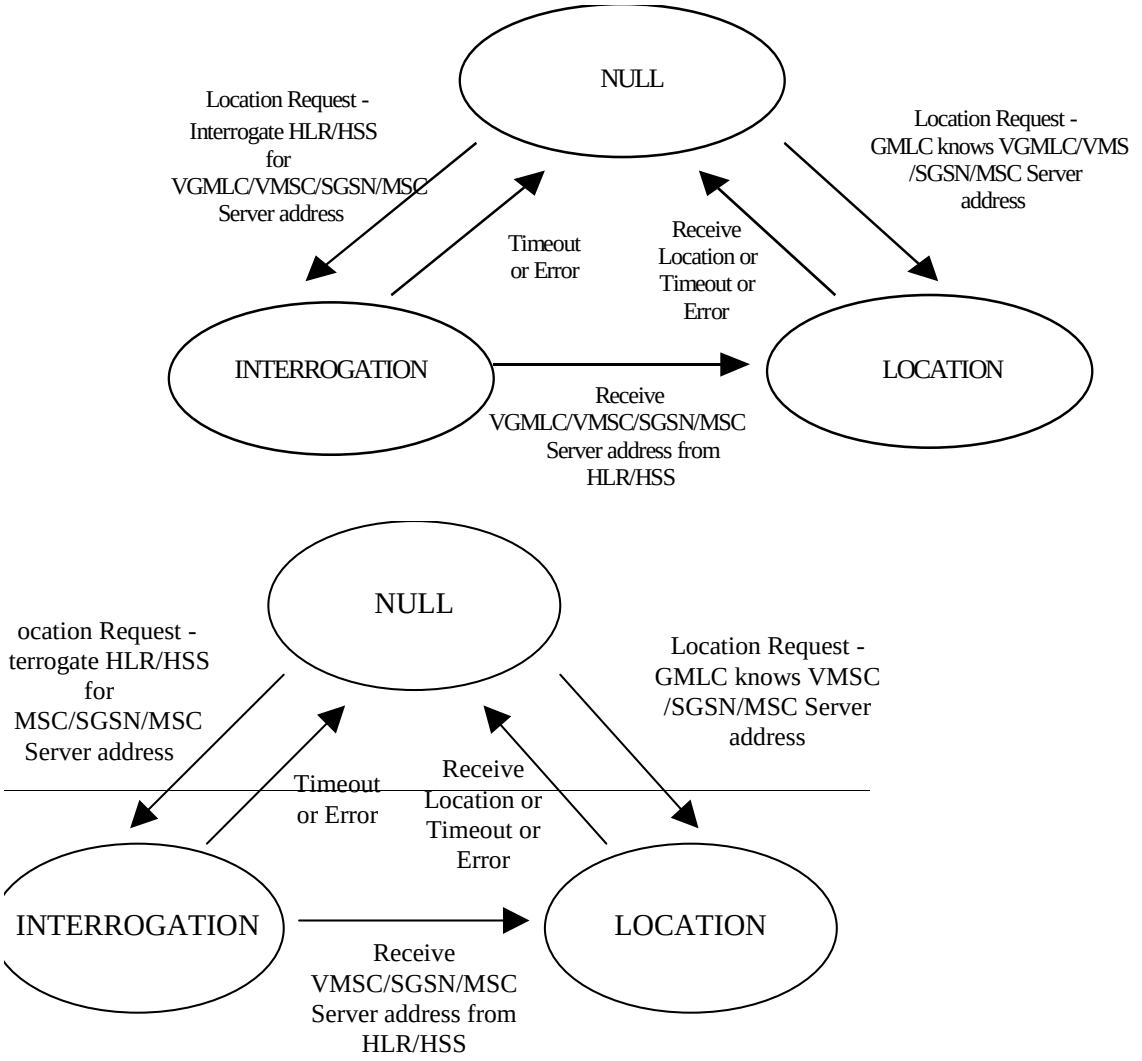


Figure 8.1: State Transitions in the GMLC

Moving from NULL to INTERROGATION state:

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

Moving from NULL to LOCATION state:

If the GMLC already knows one of the following addresses: VMSC, MSC Server, SGSN or UE IMSI, when it receives a location service request from some LCS client (e.g. from information retained for an earlier location request for the same UE), it moves from the NULL state to the LOCATION state and sends a location request to either the VMSC, MSC Server or SGSN. Optionally, it may send the location request to another GMLC via the Lr [?] interface.

NOTE: It is for further study how GMLC selects if it shall send the location request to VMSC, MSC server and/or SGSN in different cases. This should be specified in the signaling procedures.

Moving from INTERROGATION to LOCATION state:

After the GMLC, in the INTERROGATION state, receives one or several of the addresses VMSC, MSC Server, SGSN, V-GMLC and IMSI from the home HLR/HSS, it enters the LOCATION state and sends a location request to either the VMSC, MSC Server, ~~or~~ SGSN or V-GMLC of the UE being located.

Moving from LOCATION to NULL state:

After the GMLC receives a location estimate response from the VMSC, MSC Server, ~~or~~ SGSN or V-GMLC, it forwards the location estimate to the requesting LCS client and re-enters the NULL state.

<<<End of changes>>>