Technical Specification Group Services and System Aspects ***TSGS#17(02)0529***

Meeting #17, Biarritz, France, 9-12 September 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 #17.

CRs applying to several Releases:

Tdoc #	Title	Spec	CR #	cat	Version in	WI	S2 meeting
S2-022192	Privacy class selection flow diagram	03.71	043	F	8.6.0	LCS	26
S2-022466	Privacy class selection flow diagram	23.171	026 r1	F	3.8.0	LCS	26
S2-021912	Privacy procedure correction	23.271	99r 1	F	4.6.0	LCS	25
S2-021913	Privacy procedure correction	23.271	100 r1	A	5.3.0	LCS1	25
S2-022468	Receiving the deferred MT-LR for the UE during waiting for the event of the same UE	23.271	114 r1	F	4.6.0	LCS1	26
S2-022469	Receiving the deferred MT-LR for the UE during waiting for the event of the same UE	23.271	115 r1	F	5.3.0	LCS1	26
S2-021903	Removal of IMS in LCS for call/session related class	23.271	101 r1	F	4.6.0	LCS1	25
S2-021904	Removal of IMS in LCS for call/session related class	23.271	102 r1	A	5.3.0	LCS1	25

CRs applying to one Release:

Tdoc #	Title	Spec	CR #	cat	Version in	WI	S2 meeting
S2-022383	Wrong numbering in chapter 5.4.3	23.171	28	F	3.8.0	LCS	26
S2-022357	Removing “HSS” and “Le is FFS” from Rel-4 specification	23.271	118	F	4.6.0	LCS1	26
S2-022467	Clarification of Interworking mechanism between network nodes in different releases	23.271	110 r1	F	5.3.0	LCS1	26
S2-021708	Handling of codeword in case of combined periodical/deferred MT-LR	23.271	96	F	5.3.0	LCS1	25
S2-022473	Introducing the privacy profile register	23.271	119 r2	B	6.0.0	LCS2-GMLC	26
S2-022462	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 9: General Network Positioning Procedures	23.271	81r 7	B	6.0.0	LCS2-GMLC	26
S2-022315	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 3, 5 and 6: Abbreviations, General LCS Architecture and LCS Architecture	23.271	111	B	6.0.0	LCS2-GMLC	26

S2-022463	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 10.5: Interworking mechanism between network nodes in different releases	23.271	112 r1	B	6.0.0	LCS2-GMLC	26
S2-022464	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 9.1.2/9.1.6: CS-MT-LR/PS-MT-LR Procedures	23.271	113 r1	B	6.0.0	LCS2-GMLC	26
S2-021917	Type indicator for LCS client name and requestor identity	23.271	105 r2	B	6.0.0	LCS2	25

3GPP TSG-SA2 Meeting #26
Toronto, Canada, 19 – 23 August 2002

Tdoc ⌘SA2-022192

CR-Form-v7

CHANGE REQUEST

⌘ **03.71** **CR** **43** ⌘**rev** **-** ⌘ Current version: **8.6.0** ⌘

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

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

Title:	⌘	Privacy class selection flow diagram
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	13/08/2002
Category:	⌘	**F**
Release:	⌘	R99

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

Use one of the following releases:

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

Reason for change:	⌘	The selection of the privacy classes is described ambiguous. It is not clearly described, that once the call related privacy class has been checked there is no succeeding check for the call unrelated privacy class.
Summary of change:	⌘	An informative annex A has been added to describe the privacy class selection rules with referring notes to it in those sections describing the privacy classes individually
Consequences if not approved:	⌘	The ambiguouity for the privacy class selection remains.

Clauses affected:	⌘	Section 7.12.2, 7.12.3, Annex E, Annex F

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

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

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

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

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

********** -- First modified section -- **********

7.12.2 Privacy Procedures

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

The SLPP shall be downloaded to the VMSC together with the rest of his subscription information in the existing MAP operation INSERT_SUBSCRIBER_DATA. It will be deleted with the existing MAP operation DELETE_SUBSCRIBER_DATA.

The POI is transferred from the GMLC to the VMSC in the location request. Based on the location of the GMLC the VMSC evaluates whether to accept or ignore the received POI according to the definition in Section 6.6.1.

If the POI is accepted the location requested is unconditionally performed. Otherwise if the POI is ignored the VMSC evaluates the privacy options in the MS subscriber's subscription profile (assuming this is held in the VLR). If the VLR does not contain the MS subscription profile, LCS will rely on the existing GSM recovery mechanisms to obtain the profile.

Note: If more than one privacy class are subscribed for the MS, the privacy class for an MT-LR is selected according to the rule described in the informative ANNEX E.

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.

7.12.3 MS Privacy Options

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

a) Universal Class – allow positioning by all LCS clients

b) Call related Class – comprises any LCS client to which the MS originated a call that is currently established. For all clients in the call related class, one of the following subscription options shall apply:

- positioning allowed without notifying the MS user (default case);
- positioning allowed with notification to the MS user;
- positioning requires notification and verification by the MS user; positioning is allowed only if granted by the MS user or if there is no response to the notification;
- positioning requires notification and verification by the MS user; positioning is allowed only if granted by the MS user;

c) Non-Call related Class – allow positioning by specific identified LCS Clients or groups of LCS Client with the following restrictions allowed for each identified LCS Client or group of LCS Clients

- Location request allowed only from GMLCs identified in the SLPP
- Location request allowed only from a GMLC in the home country
- Location request allowed from any GMLC

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

- positioning allowed without notifying the MS user (default case);
- positioning allowed with notification to the MS user;

- positioning requires notification and verification by the MS user; positioning is allowed only if granted by the MS user or if there is no response to the notification;
- positioning requires notification and verification by the MS user; positioning is allowed only if granted by the MS user;

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

- positioning not allowed (default case);
- positioning allowed with notification to the MS user;
- positioning requires notification and verification by the MS user; positioning is allowed only if granted by the MS user or if there is no response to the notification;
- positioning requires notification and verification by the MS user; positioning is allowed only if granted by the MS user;

d) PLMN operator Class – allow positioning by specific types of client within or associated with the VPLMN, with the following types of client identified:

- clients providing a location related broadcast service
- O&M client in the HPLMN (when the MS is currently being served by the HPLMN)
- O&M client in the VPLMN
- Clients recording anonymous location information without any MS identifier
- Clients enhancing or supporting any supplementary service, IN service, bearer service or teleservice subscribed to by the target MS subscriber

If the MS subscribes to the universal class, any MT-LR or NI-LR shall be allowed by the VMSC. If local regulatory requirements mandate it, any MT-LR for an emergency services LCS client and any NI-LR for an emergency services call origination shall be allowed by the VMSC.

If the MS subscribes to the call-related class, an MT-LR may be allowed if the MS previously originated a call that is still established and the called party number dialed by the MS matches the called party number received from the GMLC. If the called party number conditions are satisfied, the MT-LR shall be allowed if the MS user subscribes to either location without notification or location with notification. If the MS user subscribes to location with notification and privacy verification, the MT-LR shall be allowed following notification to the MS if the MS user either returns a response indicating that location is allowed or returns no response but subscribes to allowing location in the absence of a response. In all other cases, the MT-LR shall be restricted.

If the MS subscribes to the non-call related class, an MT-LR may be allowed by the network if the identity of the LCS client or LCS client group supplied by the GMLC matches the identity of any LCS Client or LCS Client group contained in the MS's SLPP and any other GMLC restrictions associated with this LCS Client identity in the SLPP are also met. If the LCS client is correctly matched in this way and any GMLC restrictions are satisfied, the MT-LR shall be allowed if the MS user subscribes to either location without notification or location with notification. If the MS user subscribes to location with notification and privacy verification, the MT-LR shall be allowed following notification to the MS if the MS user either returns a response indicating that location is allowed or returns no response but subscribes to location in the absence of a response. In all other cases, the MT-LR shall be restricted.

If the MS subscribes to the non-call related class, an MT-LR from an LCS client that is not contained in the MS's SLPP shall allowed or restricted according to the following conditions. For any non-matched LCS client, the MT-LR shall be allowed if the MS user subscribes to location with notification. If the MS user subscribes to location with notification and privacy verification, the MT-LR shall be allowed following notification to the MS if the MS user either returns a response indicating that location is allowed or returns no response but subscribes to location in the absence of a response. In all other cases, the MT-LR shall be restricted.

If the MS subscribes to the PLMN class, an NI-LR or MT-LR shall be allowed if the client within the VPLMN, for an NI-LR, or the client identified by the GMLC, for an MT-LR, either matches a generic type of client contained in the MS's SLPP or is otherwise authorized by local regulatory requirements to locate the MS.

Note: If more than one privacy class are subscribed for the MS, the privacy class for an MT-LR is selected according to the rule described in the informative ANNEX E.

In evaluating privacy where any address "A" associated with the LCS client (e.g. LCS client ID or GMLC address) needs to be compared with a corresponding address "B" in the target MS's SLPP, a match shall be determined if a match is found for each of the following components of each address:

a) Numbering Plan

b) Nature of Address Indicator

c) Corresponding address digits for all digits in "B" (the digits or initial digits in "A" must match all the digits in "B", but "A" may contain additional digits beyond those in "B")

All addresses shall be transferred to the MSC/VLR in international format, except for the called party number received from the GMLC during a Call Related MT-LR when the LCS client was reached via IN or abbreviated number routing (e.g. toll free number or emergency call routing). In these cases it is up to the GMLC to use the valid national specific number of the visited country.

********** -- Next modified section -- **********

Annex E (informative): Privacy class selection rule

If more than one privacy class are subscribed for the MS, privacy class for an MT-LR is selected according to the following flow diagram.

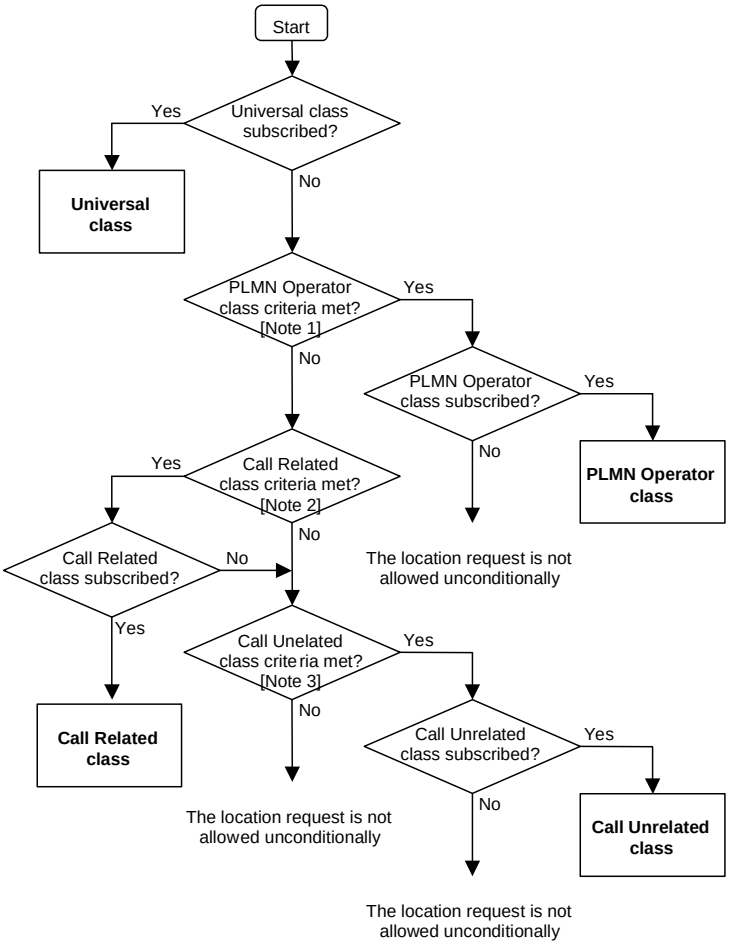

Figure A.1: Privacy Class selection flow diagram

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

********** -- Next modified section -- **********

Annex ~~E~~ F (informative): Change History

Change history						
Meeting#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**
SMG#29	03.71		-	R98	7.0.0	Approved at SMG#29
SMG#30	03.71	7.0.0	A001r1	R98	7.1.0	Addition of further LCS functionality in GSM Release 98
SMG#30bis	03.71	7.1.0	A003	R98	7.2.1	Addition of further LCS functionality in GSM Release 98 (CR A002r1 was withdrawn)
SMG#31	03.71	7.2.1	A005	R98	7.3.0	Corrections for LCS Open Issues
SMG#31	03.71	7.2.1	A006	R98	7.3.0	Clarify provision of GPS and E-OTD assistance data to a target MS
SMG#31	03.71	7.2.1	A007	R98	7.3.0	Modifications to support broadcast of GPS assistance data
SP-08	03.71	7.3.0	A008	R98	7.4.0	Ensure reliable privacy verification for value added LCS MT-LR
-	03.71	7.4.0	-	R99	8.0.0	R99 version, same content as v.7.4.0
SP-11	03.71	8.0.0	A010	R99	8.1.0	Segmentation/Pre-emption for LCS
SP-11	03.71	8.0.0	A014	R99	8.1.0	LCS error handling (Inter-BSC Handover)
SP-11	03.71	8.0.0	A017	R99	8.1.0	Corrections of A-GPS Broadcast Descriptions
SP-11	03.71	8.0.0	A019	R99	8.1.0	Applicability of LCS services in CS domain to GPRS mobile stations
SP-11	03.71	8.0.0	A012	R99	8.1.0	Correction; BSSMAP Location Information Report replaced by BSSMAP Connection Oriented Information
SP-11	03.71	8.0.0	A021	R99	8.1.0	Geographical shape restriction in LCS
SP-12	03.71	8.1.0	A026r1	R99	8.2.0	Correct reference of GAD shape
SP-12	03.71	8.1.0	A028r1	R99	8.2.0	Privacy Check procedure for call related MT-LR
SP-13	03.71	8.2.0	A029r1	R99	8.3.0	Applicability of Privacy Override Indicator
SP-13	03.71	8.2.0	A031r1	R99	8.3.0	Correction of Inconsistent Text
SP-14	03.71	8.3.0	A034	R99	8.4.0	Error handling for E-OTD and GPS
SP-15	03.71	8.4.0	A040	R99	8.5.0	Removal of NA-ESRK from MT-LR request for North American Emergency call
SP-16	03.71	8.5.0	042	R99	8.6.0	Correction of timing when SMLC enters LOCATION state.

3GPP TSG-SA2 Meeting #26
Toronto, Canada, 19 – 23 August 2002

Tdoc ⌘S2-022466
(Revised S2-022193)

CR-Form-v7

CHANGE REQUEST

⌘ **23.171** **CR** **26** ⌘**rev** **1** ⌘ Current version: **3.8.0** ⌘

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

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

Title:	⌘	Privacy class selection flow diagram
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	22/08/2002
Category:	⌘	**F**
Release:	⌘	R99

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

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

Reason for change:	⌘	The selection of the privacy classes is described ambiguous. It is not clearly described, that once the call related privacy class has been checked there is no succeeding check for the call unrelated privacy class.
Summary of change:	⌘	An informative annex A has been added to describe the privacy class selection rules with referring notes to it in those sections describing the privacy classes individually
Consequences if not approved:	⌘	The ambiguouity for the privacy class selection remains.

Clauses affected:	⌘	Section 8.11.2, 8.11.3, Annex A, Annex B

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

How to create CRs using this form:
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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 -- **********

8.11.2 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 together with the rest of his subscription information in the existing MAP operation INSERT_SUBSCRIBER_DATA. It will be deleted with the existing MAP operation DELETE_SUBSCRIBER_DATA.

The POI is transferred from the GMLC to the VMSC in the location request. Based on the location of the GMLC the VMSC evaluates whether to accept or ignore the received POI according to the definition in subclause 8.11.3.

If the POI is accepted the location requested is unconditionally performed. Otherwise if the POI is ignored the VMSC evaluates the privacy options in the UE subscriber's subscription profile (assuming this is held in the VLR). If the VLR does not contain the UE subscription profile, LCS will rely on the existing GSM recovery mechanisms to obtain the profile.

Note: If more than one privacy class are subscribed for the UE, the privacy class for an MT-LR is selected according to the rule described in the informative ANNEX A.

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.

8.11.3 UE Privacy Options

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

a) Universal Class – allow positioning by all LCS clients

b) Call related Class – comprises any LCS client to which the UE originated a call that is currently established. For all clients in the call related class, one of the following subscription options shall apply:

- positioning allowed without notifying the UE user (default case)
- positioning allowed with notification to the UE user
- positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification
- positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user

c) Non-Call related Class – allow positioning by specific identified LCS Clients or groups of LCS Client with the following restrictions allowed for each identified LCS Client or group of LCS Clients

- Location request allowed only from GMLCs identified in the SLPP
- Location request allowed only from a GMLC in the home country
- Location request allowed from any GMLC (default case)

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

- positioning allowed without notifying the UE user (default case)
- positioning allowed with notification to the UE user

- positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification
- positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user

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

- positioning not allowed (default case)
- positioning allowed with notification to the UE user
- positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification
- positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user

d) PLMN operator Class – allow positioning by specific types of client within or associated with the VPLMN, with the following types of client identified:

- clients providing a location related broadcast service
- O&M client in the HPLMN (when the UE is currently being served by the HPLMN)
- O&M client in the VPLMN
- Clients recording anonymous location information without any UE identifier
- Clients enhancing or supporting any supplementary service, IN service, bearer service or teleservice subscribed to by the target UE subscriber

If the UE subscribes to the universal class, any MT-LR or NI-LR shall be allowed by the VMSC. If local regulatory requirements mandate it, any MT-LR for an emergency services LCS client and any NI-LR for an emergency services call origination shall be allowed by the VMSC.

If the UE subscribes to the call-related class, an MT-LR may be allowed if the UE previously originated a call that is still established and the called party number dialled by the UE matches the called party number received from the GMLC. If the called party number conditions are satisfied, the MT-LR shall be allowed if the UE user subscribes to either location without notification or location with notification. If the UE user subscribes to location with notification and privacy verification, the MT-LR shall be allowed following notification to the UE if the UE user either returns a response indicating that location is allowed or returns no response but subscribes to allowing location in the absence of a response. In all other cases, the MT-LR shall be restricted.

If the UE subscribes to the non-call related class, an MT-LR may be allowed by the network if the identity of the LCS client or LCS client group supplied by the GMLC matches the identity of any LCS Client or LCS Client group contained in the UE's SLPP and any other GMLC restrictions associated with this LCS Client identity in the SLPP are also met.

If the LCS client is correctly matched in this way and any GMLC restrictions are satisfied, the MT-LR shall be allowed if the UE user subscribes to either location without notification or location with notification. If the UE user subscribes to location with notification and privacy verification, the MT-LR shall be allowed following notification to the UE if the UE user either returns a response indicating that location is allowed or returns no response but subscribes to location in the absence of a response. In all other cases, the MT-LR shall be restricted.

If the UE subscribes to the non-call related class, an MT-LR from an LCS client that is not contained in the UE's SLPP shall allowed or restricted according to the following conditions. For any non-matched LCS client, the MT-LR shall be allowed if the UE user subscribes to location with notification. If the UE user subscribes to location with notification and privacy verification, the MT-LR shall be allowed following notification to the UE if the UE user either returns a response indicating that location is allowed or returns no response but subscribes to location in the absence of a response. In all other cases, the MT-LR shall be restricted.

If the UE subscribes to the PLMN class, an NI-LR or MT-LR shall be allowed if the client within the VPLMN, for an NI-LR, or the client identified by the GMLC, for an MT-LR, either matches a generic type of client contained in the UE's SLPP or is otherwise authorized by local regulatory requirements to locate the UE.

Note: If more than one privacy class are subscribed for the UE, the privacy class for an MT-LR is selected according to the rule described in the informative ANNEX A.

In evaluating privacy where any address "A" associated with the LCS client (e.g. LCS client ID or GMLC address) needs to be compared with a corresponding address "B" in the target UE's SLPP, a match shall be determined if a match is found for each of the following components of each address:

a) Numbering Plan

b) Nature of Address Indicator

c) Corresponding address digits for all digits in "B" (the digits or initial digits in "A" must match all the digits in "B", but "A" may contain additional digits beyond those in "B")

All addresses shall be transferred to the MSC/VLR in international format, except for the called party number received from the GMLC during a Call Related MT-LR when the LCS client was reached via IN or abbreviated number routing (e.g. toll free number or emergency call routing). In these cases it is up to the GMLC to use the valid national specific number of the visited country.

********** -- Next modified section -- **********

Annex A (informative): Privacy class selection rule

If more than one privacy class are subscribed for the UE, the privacy class for an MT-LR is selected according to the following flow diagram.

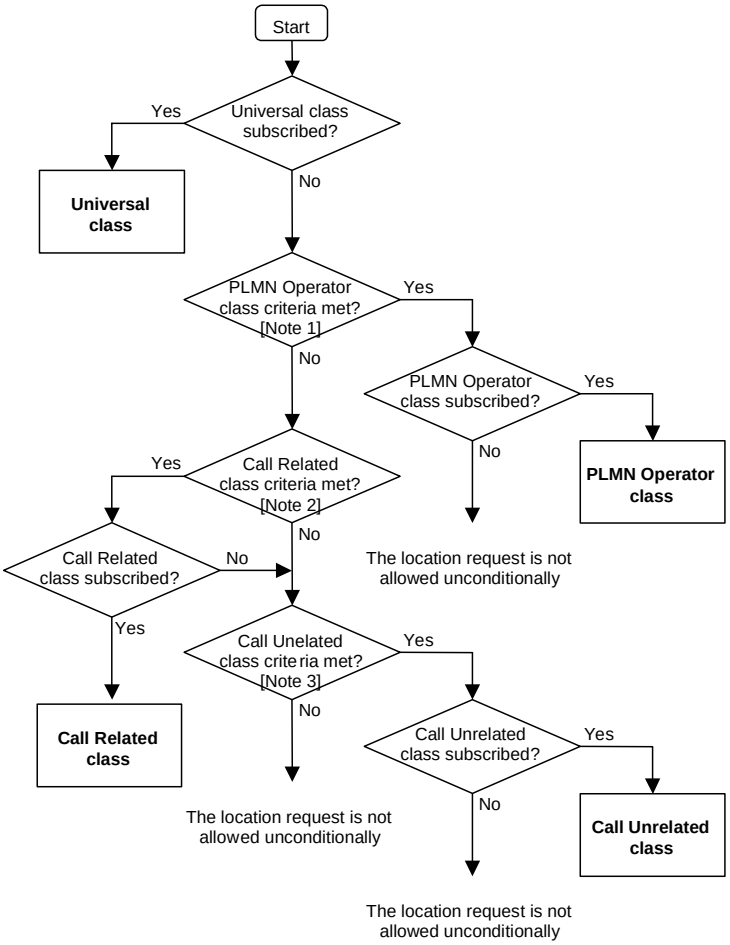

Figure A.1: Privacy Class selection flow diagram

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

********** -- Next modified section -- **********

Annex ~~A~~ B (informative): Change history

Date	New Version	Comment
March 2000	3.0.0	Output from SA#7. Minor editorial changes compared to v.2.0.0
July 2000	3.1.0	Output from SA#8. The main change is the deletion of all the PS related material (will be re-introduced in LCS R00 in 23.271) CR implemented: 001r1: Ensure reliable privacy verification for value added LCS MT-LR 002r1: Adding "hooks" indications in UMTS LCS stage 2, Removing PS LCS signaling procedures from R99 23.171. Note: the CR was mentioning that “Text marked within { brackets } is intended for releases later than Release 99.” : this text has not been incorporated. All the text marked within { brackets } has been deleted (not applicable to R99).
December 2000	3.2.0	Incorporation of CR 005 on adding a chapter “MT-LR without HLR Query – applicable to North America Emergency Calls only” to 23.171
March 2001	3.3.0	Incorporation of the following CRs, approved at SA#11: CR015 "Service Area Definition in LCS stage2", CR016 "Stop reporting procedure for UMTS" and CR017 "Privacy check procedure for call related MT-LR"
June 2001	3.4.0	Incorporation of the following CR, approved at SA#12: CR 018r1 "LCS location notification messages"
October 2001	3.5.0	Incorporation of the following CR, approved at SA#13: CR 019r1 " Applicability of Privacy Override Indicator"
December 2001	3.6.0	Incorporation of the following CR, approved at SA#14: CR020 “Wrong node name in privacy check procedures” CR021 “Exception procedures in the VMSC”
March 2002	3.7.0	Incorporation of the following CR, approved at SA#15: CR023r1 Correction of information flows LCS client – GMLC CR024r1 Removal of NA-ESRK from MT-LR request for North American Emergency call
June 2002	3.8.0	Incorporation of the following CR, approved at SA#16 CR025r2 Clarification of CS-MO-LR procedures

3GPP TSG-SA2#25
Naantali, Finland, 24-28 June 2002

S2-021912
(Revised S2-021758)

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **99** ⌘**rev** **-1** ⌘ Current version: **4.6.0** ⌘

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

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

Title:	⌘	Privacy procedure correction
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	26 June 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:	⌘	a) The reference to the privacy class selection rules is described below the privacy procedures (clause 9.5.2); it belongs to the UE privacy options describing the classes (clause 9.5.3). b) The local regulatory procedures are described below the universal class (clause 9.5.3.1); it belongs to the privacy procedures (9.5.2). c) Text contained in the headline for universal class (clause 9.5.3.1) and in clause 9.5.3.2 should be removed. d) unclear description of the "call criteria class met" in the note 2 of annex A
Summary of change:	⌘	a) The reference to the privacy class selection rules should be improved and moved below the UE privacy options (clause 9.5.3). b) The local regulatory requirements should be moved below the privacy procedures (clause 9.5.2). c) Text contained in the headline for universal class (clause 9.5.3.1) and in clause 9.5.3.2 should be removed. d) the description of the "call criteria class met" in the note 2 of annex A should be improved
Consequences if not approved:	⌘	For a), b), c), d) – the text is difficult to find and understand

Clauses affected:	⌘	9.5.2, 9.5.3, 9.5.3.1, 9.5.3.2, annex A
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/specs/CR.htm.
Below is a brief summary:

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

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

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

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

9.5.2 Privacy Procedures

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

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

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

If the POI is accepted the location requested is unconditionally performed. Otherwise if the POI is ignored the VMSC/MSC Server/SGSN evaluates the privacy options in the UE subscriber's subscription profile (assuming this is held in the VLR/MSC Server/SGSN). If the corresponding register does not contain the UE subscription profile, LCS will rely on the existing GSM recovery mechanisms to obtain the profile.

~~If more than one privacy class are subscribed, privacy class for an MT-LR is selected according to the rule described in the ANNEX A.~~

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

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

9.5.3 UE Privacy Options

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

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

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

b) Call/Session related Class

c) Call/Session-unrelated Class

d) PLMN operator Class

All UE privacy options of above four classes are commonly used for both CS and PS domain.
The privacy classes are selected according to the rules described in the ANNEX A. If more than one privacy class are subscribed in the UE's SLPP, the looser privacy setting shall be selected.
Note: If a privacy option setting in a domain is updated, the same modification will be applied to the other domain.

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

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

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

~~for an emergency services LCS client and any NI-LR for an emergency services call origination shall be allowed by the VMSC/MSC Server.~~

9.5.3.2 Call/Session related class

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

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

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

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

* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

* positioning not allowed;
* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

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

Annex A (normative): Privacy Class selection rule

If more than one privacy class are subscribed, 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. 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. The interrelation among each privacy setting in terms of privacy strictness is shown as follows:

loose	Positioning allowed without notifying the UE user
↑	Positioning allowed with notification to the UE user
	Positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification
	Positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user
↓	
strict	Positioning not allowed

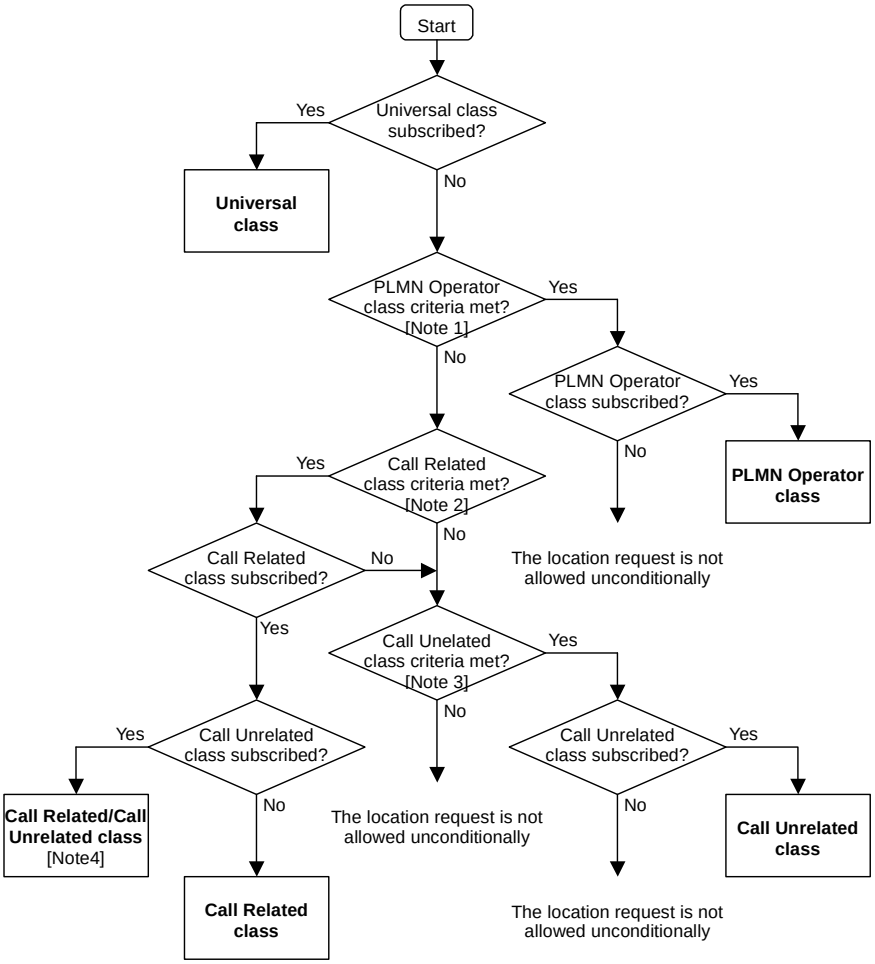

Figure A.1: Privacy Class selection flow diagram

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

3GPP TSG-SA2#25
Naantali, Finland, 24-28 June 2002

S2-021913
(Revised S2-021759)

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **100** ⌘**rev** **-1** ⌘ Current version: **5.3.0** ⌘

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

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

Title:	⌘	Privacy procedure correction
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	26 June 2002
Category:	⌘	**A**
Release:	⌘	Rel-5

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

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

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

Clauses affected:	⌘	9.5.2, 9.5.3, 9.5.3.1, 9.5.3.2, annex A
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

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

9.5.2 Privacy Procedures

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

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

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

If the POI is accepted the location requested is unconditionally performed. Otherwise if the POI is ignored the VMSC/MSC Server/SGSN evaluates the privacy options in the UE subscriber's subscription profile (assuming this is held in the VLR/MSC Server/SGSN). If the corresponding register does not contain the UE subscription profile, LCS will rely on the existing GSM recovery mechanisms to obtain the profile.

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

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

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

9.5.3 UE Privacy Options

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

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

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

b) Call/Session related Class

c) Call/Session-unrelated Class

d) PLMN operator Class

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

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

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

If the UE subscribes to the universal class, any CS-MT-LR or NI-LR shall be allowed by the VMSC/MSC Server and any PS-MT-LR or PS-NI-LR shall be allowed by the SGSN. ~~If local regulatory requirements mandate it, any MT-LR for an emergency services LCS client and any NI-LR for an emergency services call origination shall be allowed by the VMSC/MSC Server.~~

9.5.3.2 Call/Session related class

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

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

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

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

* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

* positioning not allowed;
* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

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

Annex A (normative): Privacy Class selection rule

If more than one privacy class are subscribed or in case Service Types and at least one privacy class are subscribed, privacy class for an MT-LR is selected according to the following flow diagram.

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

loose	Positioning allowed without notifying the UE user
↑	Positioning allowed with notification to the UE user
	Positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification
	Positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user
↓	
strict	Positioning not allowed

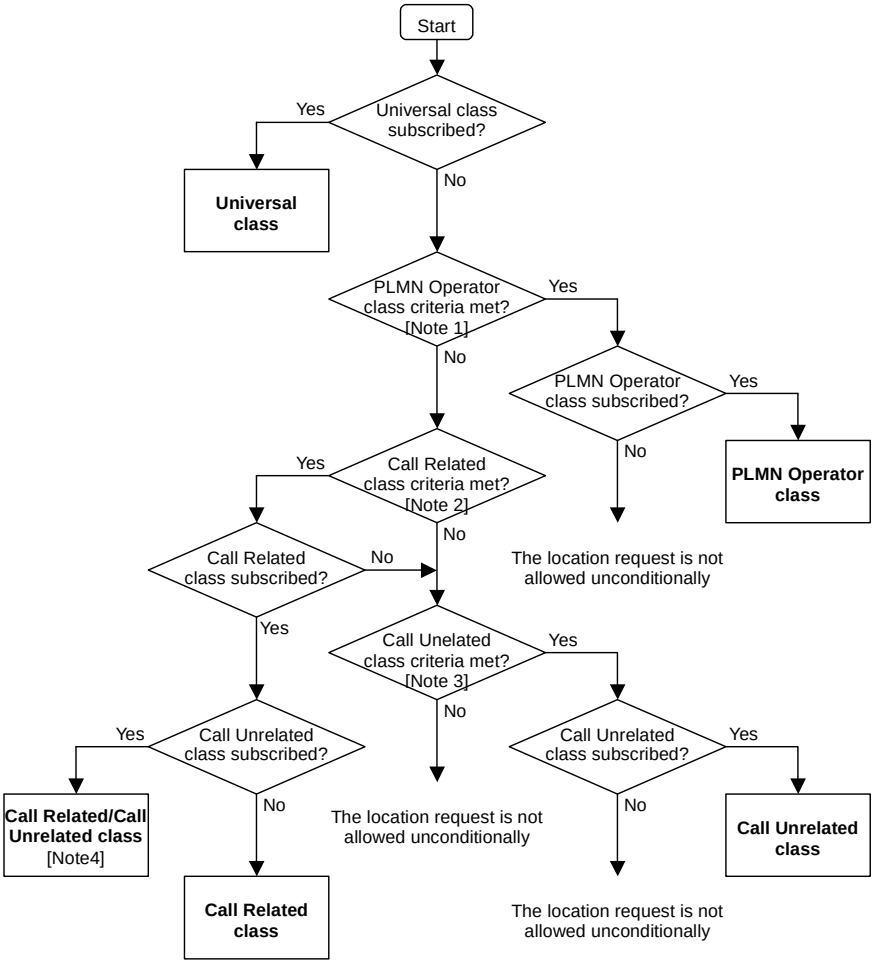

Figure A.1: Privacy Class selection flow diagram

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

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

3GPP TSG SA WG2 Meeting #26
Toronto, Canada, 19th – 23rd August 2002

S2-022468
(Revised S2-022320)

CR-Form-v7

CHANGE REQUEST

⌘ **TS23.271 CR 114** ⌘**rev 1** ⌘ Current version: **4.6.0** ⌘

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

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

Title:	⌘	Receiving the deferred MT-LR for the UE during waiting for the event of the same UE
Source:	⌘	NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	19/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	The current TS23.271 does not define the action when the GMLC receives the deferred MT-LR for the target UE during waiting for the response to the previous deferred MT-LR for the same target UE. In order to avoid introducing the complicated procedure, the GMLC should forward the deferred MT-LR to the serving MSC/SGSN regardless of the ongoing previous deferred MT-LR.
Summary of change:	⌘	The deferred MT-LR procedure during the GMLC waits for the event of the same UE is clarified. The fowlloing sentence is added to the deferred MT-LR procedure; "The GMLC sends the Provide Subscriber Location for the UE independently of the ongoing previous MT-LR for the same UE".
Consequences if not approved:	⌘	The deferred MT-LR procedure during the GMLC waits for the response to the deferred MT-LR for the same target UE is unlcear and operator may miss deploying the GMLC which supports to handle several deferred MT-LR for the same UE in parallel..

Clauses affected:	⌘	9.1.8.1

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

Other comments:	⌘	

How to create CRs using this form:

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

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

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

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

<< First changed section >>

9.1.8 Mobile Terminating Deferred Location Request

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

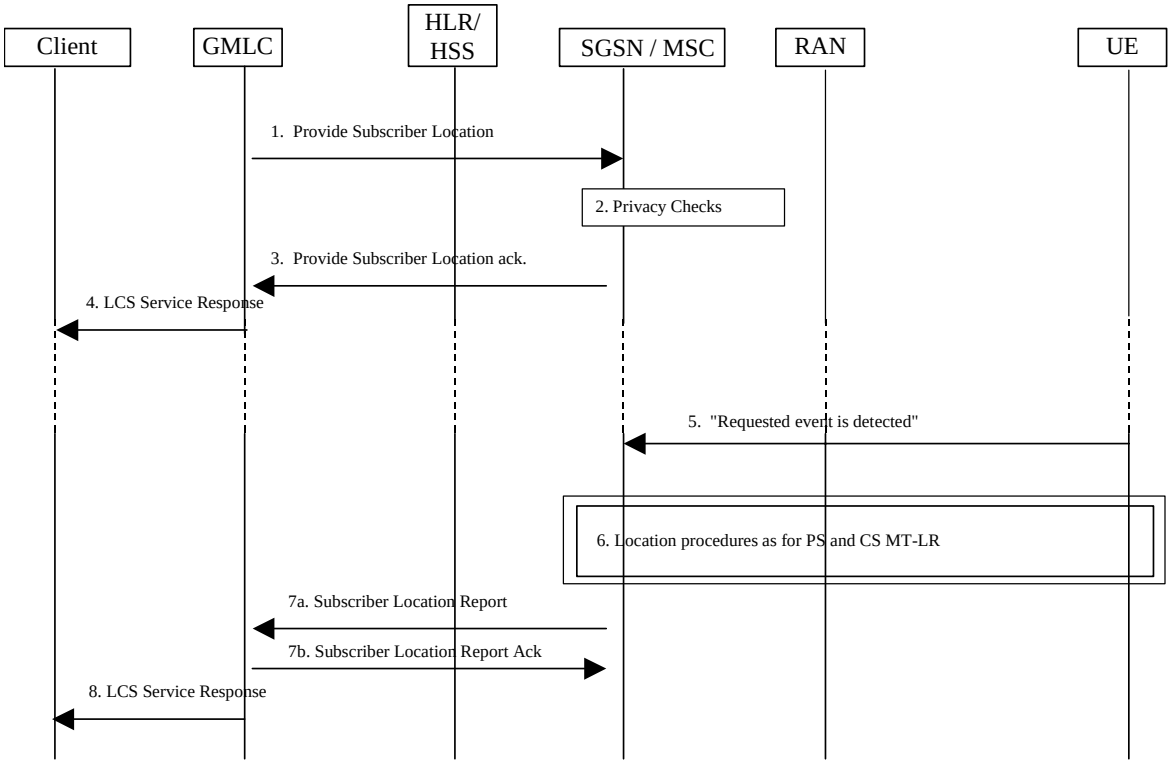

Figure 9.6a: General Network Positioning for a Deferred MT-LR

9.1.8.1 Deferred Location Request Procedure

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

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

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

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

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

3GPP TSG SA WG2 Meeting #26 ***S2-022469***
Toronto, Canada, 19th – 23rd August 2002 (Revised S2-022321)

CR-Form-v7

CHANGE REQUEST

⌘ **TS23.271** **CR** **115** ⌘**rev** **1** ⌘ Current version: **5.3.0** ⌘

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

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

Title:	⌘	Receiving the deferred MT-LR for the UE during waiting for the event of the same UE
Source:	⌘	LCS Session, NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	19/08/2002
Category:	⌘	**F**
Release:	⌘	5

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

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

Reason for change:	⌘	The current TS23.271 does not define the action when the GMLC receives the deferred MT-LR for the target UE during waiting for the response to the previous deferred MT-LR for the same target UE. In order to avoid introducing the complicated procedure, the GMLC should forward the deferred MT-LR to the serving MSC/SGSN regardless of the ongoing previous deferred MT-LR.
Summary of change:	⌘	The deferred MT-LR procedure during the GMLC waits for the event of the same UE is clarified. The fowlloing sentence is added to the deferred MT-LR procedure; "The GMLC sends the Provide Subscriber Location for the UE independently of the ongoing previous MT-LR for the same UE".
Consequences if not approved:	⌘	The deferred MT-LR procedure during the GMLC waits for the response to the deferred MT-LR for the same target UE is unlcear and operator may miss deploying the GMLC which supports to handle several deferred MT-LR for the same UE in parallel. This causes that operator miss responding the deferred MT-LRs coming from deferrent requestor through the same LCS client.

Clauses affected:	⌘	9.1.8.1, 9.1.8.3			
Other specs affected:	⌘	**Y** / **N**	Other core specifications	⌘	TS29.002
		N	Test specifications		
		N	O&M Specifications		
Other comments:	⌘				

How to create CRs using this form:

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

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

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

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

<< First changed section >>

9.1.8 Mobile Terminating Deferred Location Request

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

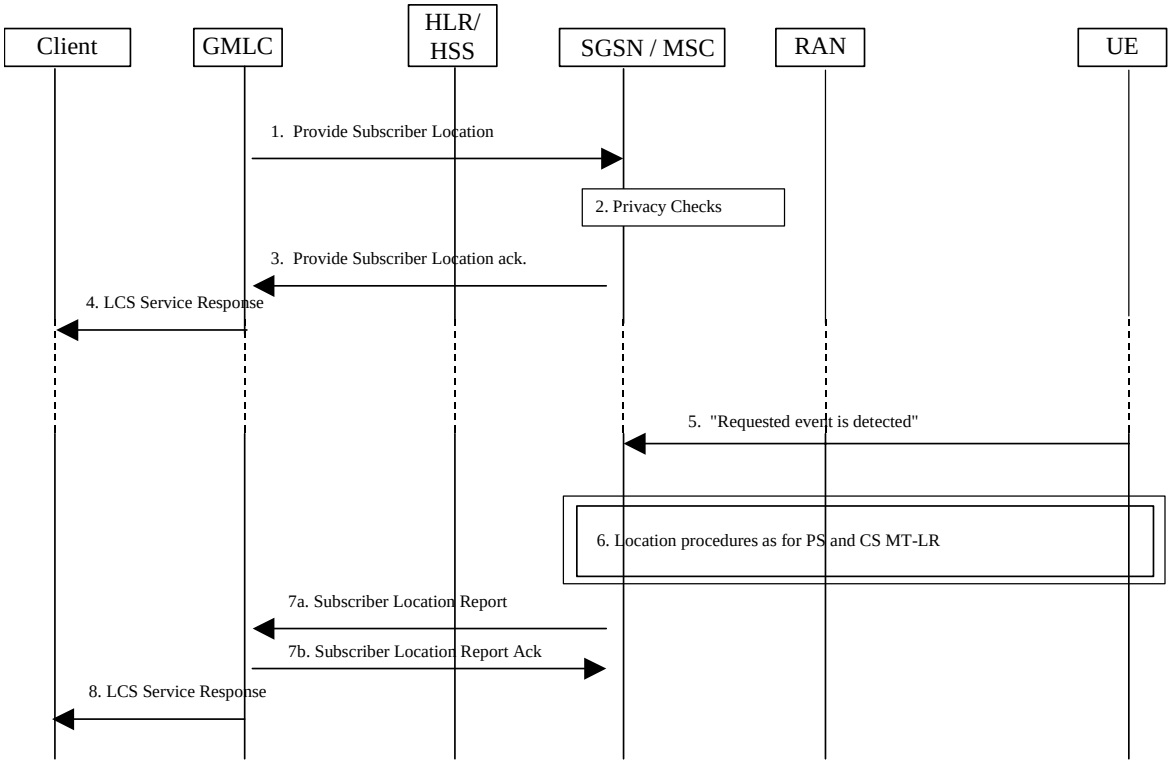

Figure 9.6a: General Network Positioning for a Deferred MT-LR

9.1.8.1 Deferred Location Request Procedure

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

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

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

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

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

<< Next changed section >>

9.1.8.3 Combined Periodical/Deferred Mobile Terminating Location Request

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

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

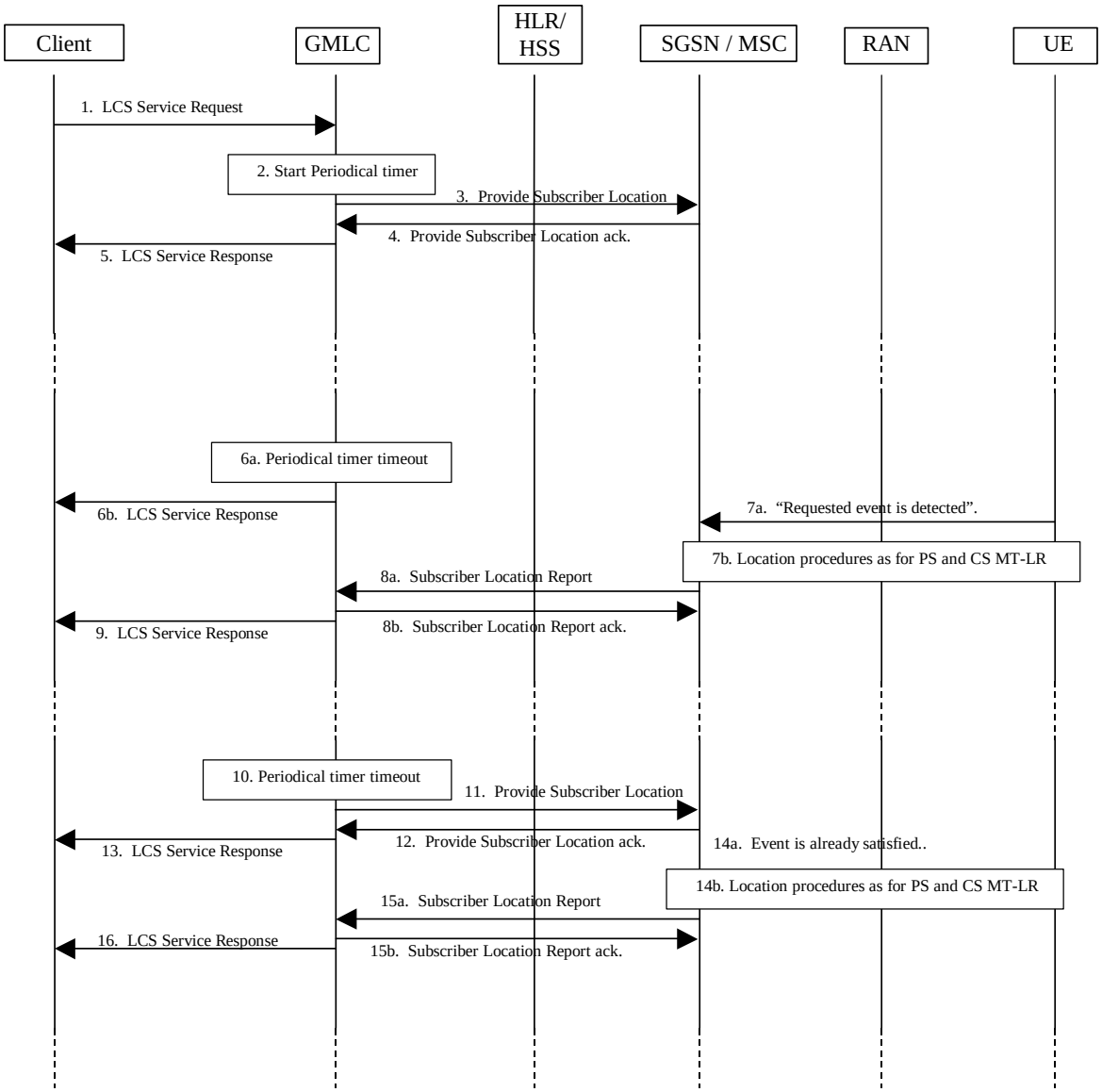

Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

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

2) The GMLC starts the periodical timer, sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and gets SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), the Send Routing Info is not sent to the HLR/HSS.

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

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

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

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

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

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

3GPP TSG-SA2#25
Naantali, Finland, 24-28 June 2002

S2-021903
(Revised S2-021760)

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **101** ⌘**rev** **1** ⌘ Current version: **4.6.0** ⌘

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

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

Title:	⌘	Removal of IMS in LCS for call/session related class
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	26 June 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 IMS has not been studied for LCS call/session related class in Rel-4~~5~~
Summary of change:	⌘	IMS should be removed from the Call/Session related class in clause 9.5.3.2
Consequences if not approved:	⌘	Unclear description of Call/Session related class

Clauses affected:	⌘	9.5.3.2
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.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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

Call/Session related class

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

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

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

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

* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

* positioning not allowed;
* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

3GPP TSG-SA2#25
Naantali, Finland, 24-28 June 2002

S2-021904
(Revised S2-021761)

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **102** ⌘**rev** **1** ⌘ Current version: **5.3.0** ⌘

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

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

Title:	⌘	Removal of IMS in LCS for call/session related class
Source:	⌘	Siemens
Work item code:	⌘	LCS
Date:	⌘	26 June 2002
Category:	⌘	**A**
Release:	⌘	Rel-5

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

Use one of the following releases:

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

Reason for change:	⌘	The IMS has not been studied for LCS call/session related class in Rel-5
Summary of change:	⌘	IMS should be removed from the Call/Session related class in clause 9.5.3.2
Consequences if not approved:	⌘	Unclear description of Call/Session related class

Clauses affected:	⌘	9.5.3.2
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.

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

9.5.3.2 Call/Session related class

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

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

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

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

* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

* positioning not allowed;
* positioning allowed without notifying the UE user (default case);
* positioning allowed with notification to the UE user;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
* positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

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

3GPP TSG-SA2 Meeting #26 ***Tdoc ⌘SA2-022383***
Toronto, Canada, 19 – 23 August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.171** **CR** **28** ⌘**rev** **-** ⌘ Current version: **3.8.0** ⌘

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

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

Title:	⌘	Wrong numbering in chapter 5.4.3
Source:	⌘	Ericsson
Work item code:	⌘	LCS
Date:	⌘	16/08/2002
Category:	⌘	**F**
Release:	⌘	R99

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

Use one of the following releases:

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

Reason for change:	⌘	The sub-sections in 5.4.3 are numbered 5.4.2.3.x instead of 5.4.3.x. This leads to confusion when referring to the section numbers, e.g. in a SoC.
Summary of change:	⌘	Corrected the section numbering.
Consequences if not approved:	⌘	The numbering will still be faulty.

Clauses affected:	⌘	Section 5.4.3			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

5.4.3 Subscriber handling Component

5.4.~~2.~~3.1 Location Subscriber Authorization Function (LSAF)

The Location Subscriber Authorization Function (LSAF) is responsible for authorizing the provision of a location service (LCS) for a particular mobile station (UE with SIM/USIM). Specifically, this function validates that a LCS can be applied to a given subscriber. In case LCF is in the UE then LSAF verifies that the UE subscriber has subscribed to the requested LCS service.

5.4.~~2.~~3.2 Location Subscriber Privacy Function (LSPF)

The Location Subscriber Privacy function is responsible performs all privacy related authorizations. For a target UE it shall authorize the positioning request versus the privacy options of the target UE, if any.

5.4.4 Positioning components

3GPP TSG-SA2 Meeting #26
Toronto, Canada, August 19-23, 2002

Tdoc ⌘ S2-022357

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **118** ⌘**rev** ⌘ Current version: **4.6.0** ⌘

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

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

Title:	⌘	Removing "HSS" and "Le is FFS" from Rel-4 specification
Source:	⌘	Nokia
Work item code:	⌘	LCS
Date:	⌘	09.08.2002
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	Figure 6.1 should show HLR instead of HSS, wrong note numbering corrected, Le is not FFS in Rel-4.
Summary of change:	⌘	Figure 6.1 is corrected and layout improved. FFS statement changed. "HSS" deleted in 10.1.1.
Consequences if not approved:	⌘	Figure 6.1 would cause confusion. Le statement indicates wrong expectation for Rel-4.

Clauses affected:	⌘	6 and 10.1.1			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ Figure 6.1 is also used in TS23.002 Network architecture
affected:				Test specifications	
				O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
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Below is a brief summary:

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

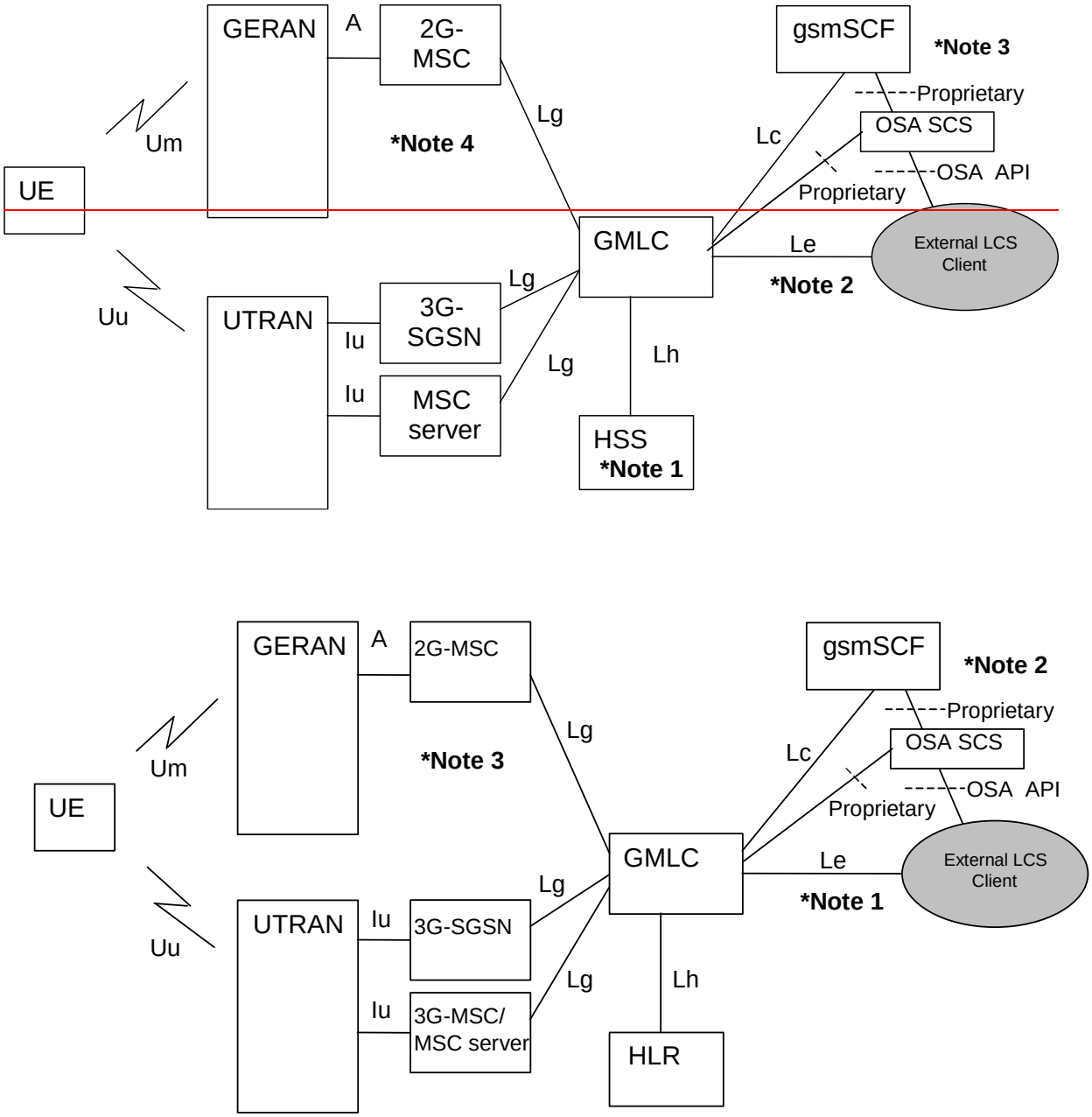
<< First changed section >>

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: The Le interface is not standardized in Rel-4~~FFS~~.
NOTE 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 3: In GSM (Rel-4), positioning is only supported on the A interface

Figure 6.1: General arrangement of LCS

<< Next changed section >>

10.1.1 LCS Data in the HLR for an UE Subscriber

The IMSI is the primary key for LCS UE subscription data in the HLR. This subscription data may be stored in a Multiple Subscriber Profile (MSP), with the HLR 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 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	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

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].

3GPP TSG-SA2 Meeting #26 *Tdoc ⌘S2-022467*
Toronto, Canada, 19th – 23rd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **110** ⌘**rev** **1** ⌘ Current version: **5.3.0** ⌘

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

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

Title:	⌘	Clarification of Interworking mechanism between network nodes in different releases
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS1
Date:	⌘	22/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

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

Use one of the following releases:

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

Reason for change:	⌘	In the current Rel-5 TS23.271 specification, LCS core network signaling capability set is defined as follows. - 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) However, the enhanced user privacy support is the only function which was introduced into the Rel-5 serving nodes. Therefore, for the capability set 2, there is no "later LCS" serving node which does not support the enhanced user privacy. Also, for the capablity set 3, there is no Rel-5 serving node without the enhanced privacy support.
Summary of change:	⌘	Definitions of the capability set 2 and 3 are corrected as follows. - LCS capability set 1: R98 and R99 LCS (pre-Rel'4 LCS) - LCS capability set 2: Rel'4 LCS - LCS capability set 3: Rel'5 or later LCS The interwoking scenarios are put together into the chapter 10.5.
Consequences if not approved:	⌘	The wrong definitions of the capability sets remain. This may cause different interpretation of the specification.

Clauses affected:	⌘	9.1.1, 10.5

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

Other comments:	⌘	The definitions in the stage 3 specification (TS29.002 v5.2.0) are correct. Therefore, there is no need to modify the stage 3 specification.

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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.

9.1.1 MT-LR routing procedure in PS and CS domain

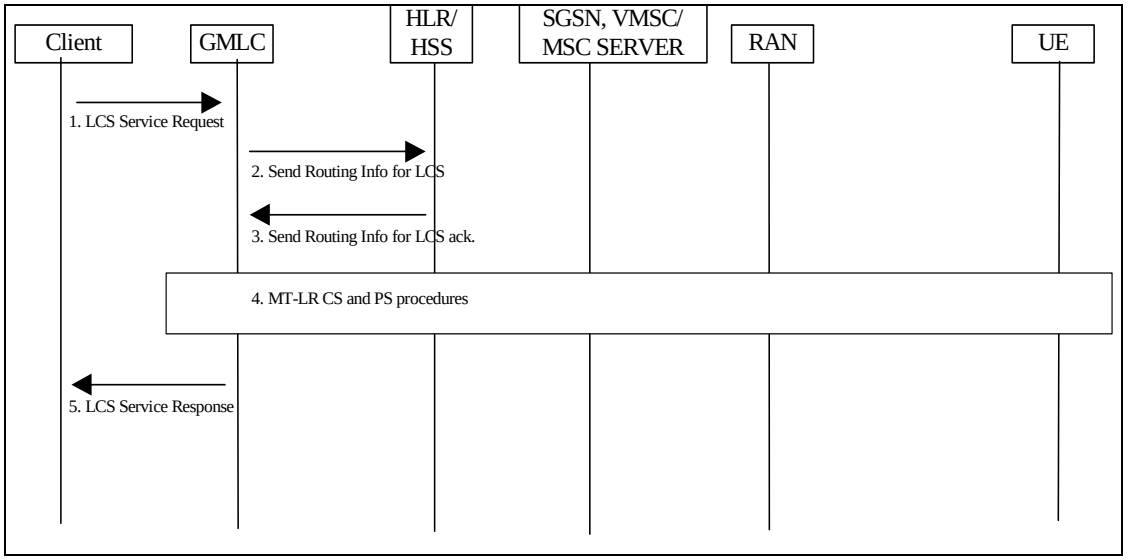

Figure 9.1: General Network Positioning for a MT-LR

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

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

2) If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the list of codeword for the target UE is stored in the GMLC, this step and step 3 may be skipped. Otherwise, the GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE. When a LCS client type is different from "value added" or the GMLC stores the list of codeword for the target UE, an indication may be sent to the HLR/HSS, in order to inform the HLR/HSS that the codeword is not applicable.

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

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

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

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

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

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

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

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

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

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

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

<< Next change >>

10.5 Interworking between network nodes in different releases

This clause describes possible scenarios for interworking between network nodes in different releases.

10.5.1 LCS capability set

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

- 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 capability set 3, shall support the following capabilities:

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

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

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

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

~~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 by the serving node, ~~-~~it may decide not to ~~not~~ send the LCS subscriber data to the serving node, in order to protect user privacy.

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

[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 #25
Naantali, Finland, 24th – 28th June 2002

Tdoc S2-021708

CR-Form-v5

CHANGE REQUEST

⌘ **23.271** **CR** **096** ⌘**rev** **-** ⌘ Current version: **5.3.0** ⌘

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

Title:	⌘	Handling of codeword in case of combined periodical/deferred MT-LR
Source:	⌘	Ericsson
Work item code:	⌘	LCS1
Date:	⌘	2002-05-30
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 current handling of the combined/periodical deferred MT-LR does not include the handling of the codeword agreed in SA2 for the general MT-LR procedure, as stated in ch. 9.1.1. In this chapter the conditions under which the GMLC can avoid sending MAP SEND_ROUTING_INFO_FOR_LCS are stated.
Summary of change:	⌘	The GMLC handling a combined periodical/deferred MT-LR shall satisfy the general handling of codeword for MT-LR, as stated in ch. 9.1.1.
Consequences if not approved:	⌘	The handling of combined periodical/deferred MT-LR is not aligned to the general codeword handling for MT-LR. Possible privacy violation in case of combined periodical/deferred MT-LR because the correct handling of codeword functionality may be skipped by the GMLC.

Clauses affected:	⌘	9.1.8.3
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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9.1.8.3 Combined Periodical/Deferred Mobile Terminating Location Request

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

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

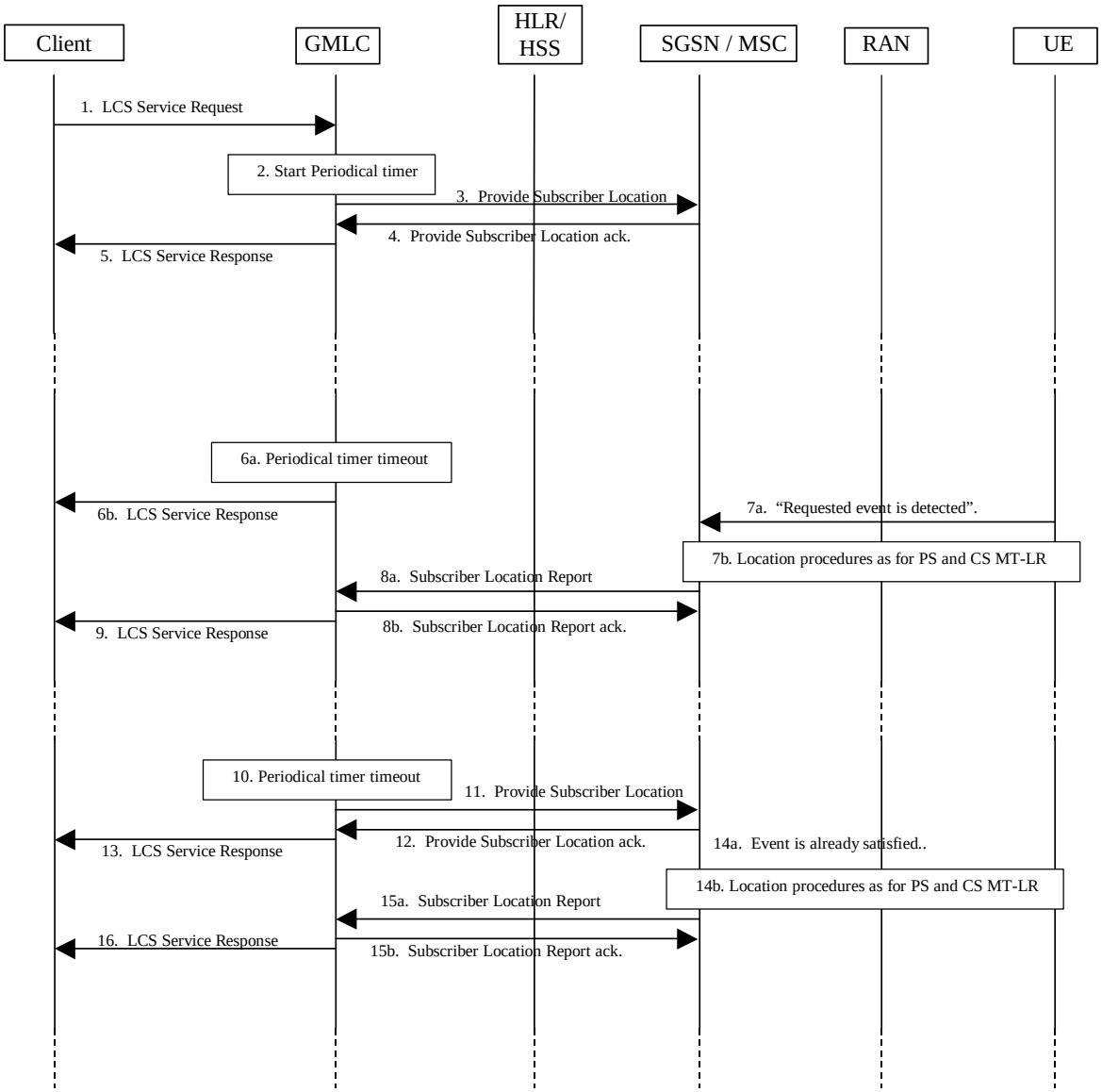

Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

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

2) The GMLC starts the periodical timer, sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and gets SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. ~~If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), the Send Routing Info is not sent to the HLR/HSS.~~

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

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

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

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

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

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

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

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

10) When the timer expires, if the GMLC is not waiting for the event, the GMLC sends a Send Routing Info for LCS to the home HLR/HSS of the target UE and receives SGSN/MSC addresses from the HLR/HSS as described in 9.1.1. ~~If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), the Send Routing Info is not sent to the HLR/HSS.~~

11) Same as step 3.

12) Same as step 4.

13) Same as step 5.

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

15) Same as step 8.

16) Same as step 9.

3GPP TSG-SA2 Meeting #26 ***Tdoc ⌘S2-022473***
Toronto, Canada, 19.–23.08.2002 (Revised S2-022465, S2-022360)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **119** ⌘**rev** **2** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Introducing the Privacy Profile Register
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	14/08/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Reason for change:	⌘	In order to keep the existing gateway functionalities of GMLC as its main tasks and to avoid making GMLC store the subscriber's privacy information and do privacy checks, there is a need to introduce a new network element called PPR (Privacy Profile Register). The PPR is connected to the Home-GMLC with a new interface, Lpp, which should be standardized in order to allow flexible network solutions. Also other privacy information of the subscriber could be kept in PPR using the same standardized Lpp interface.
Summary of change:	⌘	Introducing a new network element, the Privacy Profile Register (PPR), which holds subscribers LCS privacy information and performs the corresponding privacy checks. Also the new interface Lpp between the GMLC (H-GMLC) and the PPR is introduced.
Consequences if not approved:	⌘	All subscribers LCS privacy information must be kept in the H-GMLC and the privacy check must be done in the H-GMLC.

Clauses affected:	⌘	

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

Other comments:	⌘	The CR in the S2-022462 have also modifications to clauses 9.1.1 and 9.1.8.4, however this CR contains the latest agreed text on those clauses, so the clauses 9.1.1 and 9.1.8.4 from this CR overrides the corresponding clauses CR 081rev7, S2-022462.

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***** MODIFIED SECTION *****

3.1 Definitions

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

Pseudo-external identity: The pseudo-external identity is not the identity of real external LCS client but the identity, which is used for notifying the result of the enhanced privacy check. The pseudo-external identity shall keep the compatibility with pre Rel-5 privacy mechanisms, which does not understand privacy check result made by H-GMLC/PPR. Each operator defines its own the pseudo-external identities.

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

3.2 Symbols

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

Lpp Interface between GMLC(H-GMLC) and PPR entity.

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

3.3 Abbreviations

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

PPR Privacy Profile Register

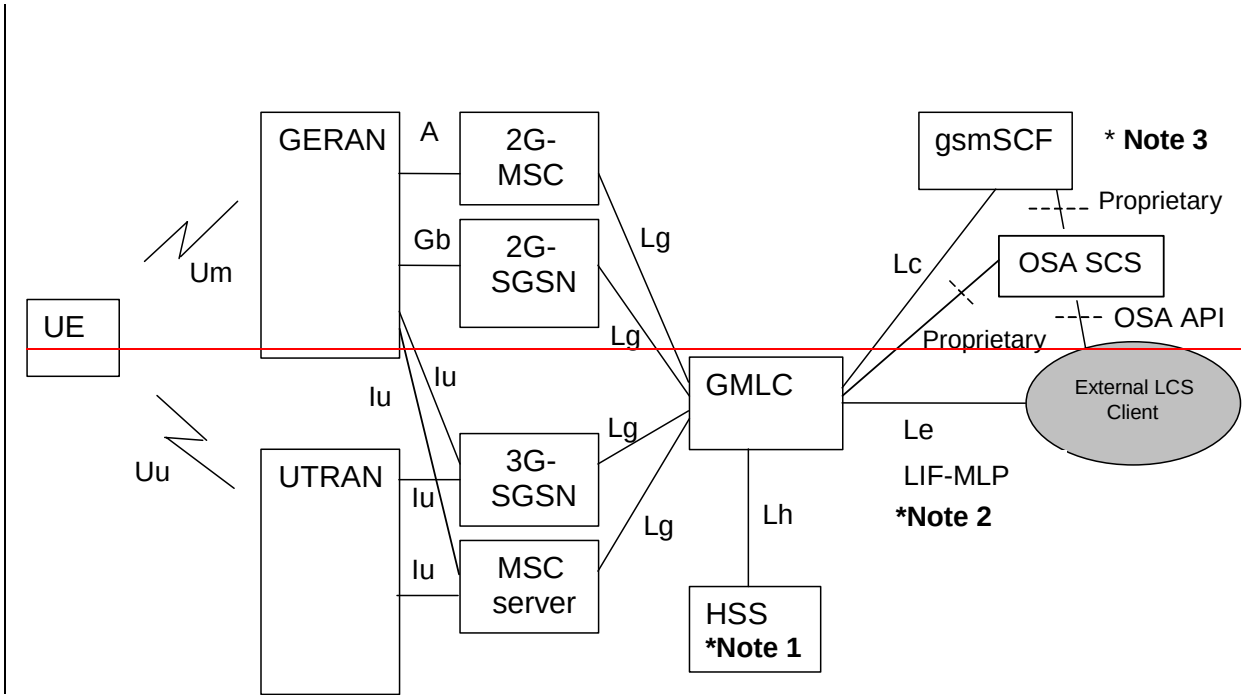
***** NEXT MODIFIED SECTION *****

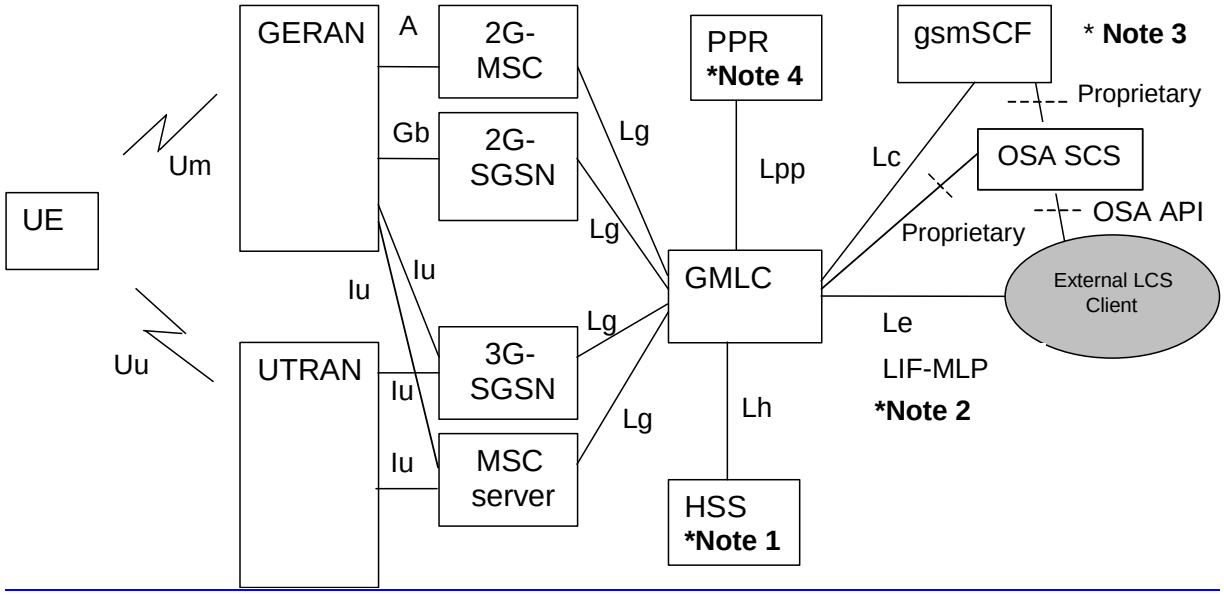
6 LCS Architecture

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, Gb and Iu interfaces. Communication among the Access Network LCS entities makes use of the messaging and signaling capabilities of the Access Network.

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

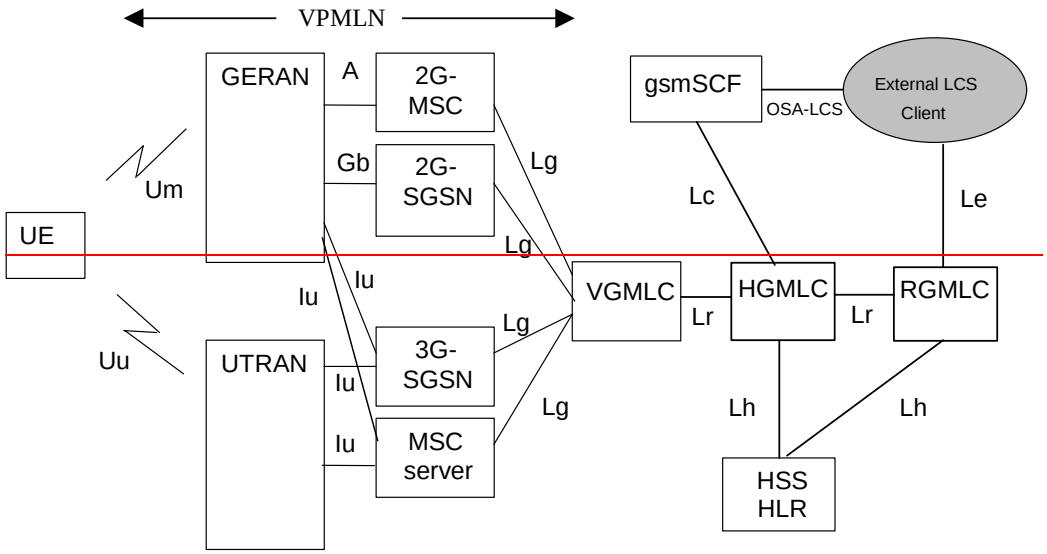
The clients make their requests to a LCS Server. There may be more than one LCS Server. The client must be authenticated and the resources of the network must be co-ordinated including the UE and the calculation functions, to estimate the location of the UE and result returned to the client. As part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





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

Figure 6.1-1: General arrangement of LCS



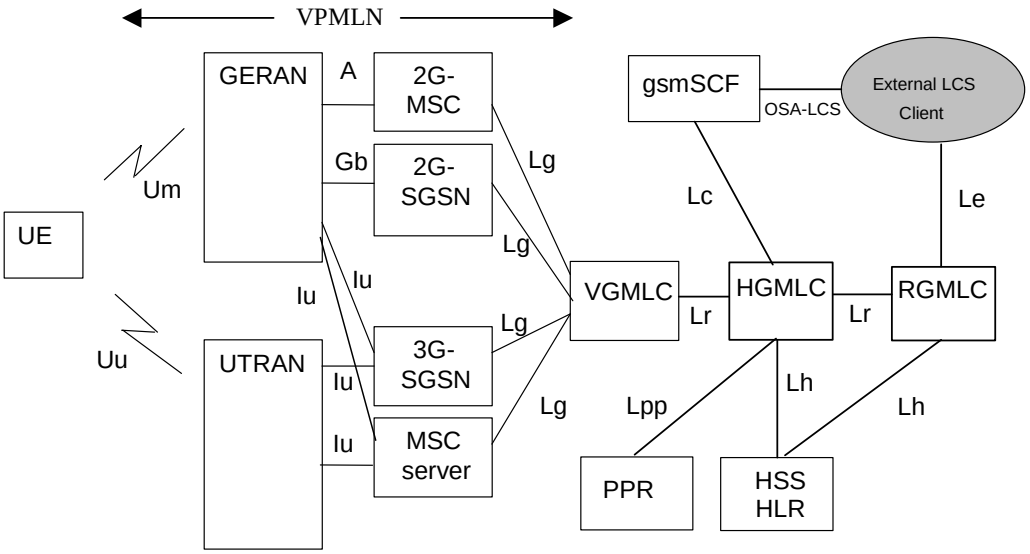


Figure 6.1-2: General arrangement of LCS with inter-GMLC [Lr] interface

***** 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
	Client handling component	Location Client Control Function	LCCF
		Location Client Authorization Function	LCAF
	System handling	Location System Control Function	LSCF

LCS Server in PLMN	component	Location System Billing Function	LSBF
		Location System Operations Function	LSOF
	Subscr. handling component	Location Subscriber Authorization Function	LSAF
		Location Subscriber Privacy function	LSPF
	Positioning component	Positioning Radio Control Function	PRCF
		Positioning Calculation Function	PCF
		Positioning Signal Measurement Function	PSMF
		Positioning Radio Resource Management	PRRM

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

It is also seen that LCS may take benefit of the Iur interface between RNCs, when uplink radio information and measurement results are collected.

The functional model presented in the figure includes functional entities for both CS and PS related LCS. In addition, it consists of all the entities needed for different positioning methods, i.e. network based, mobile based, mobile assisted, and network assisted positioning, exploiting either uplink or downlink measurements. It is noted that the UE may use e.g. the GPS positioning mechanism, but still demand e.g. auxiliary measurements from the serving network. RAN specific functional entities are specified in TS 25.305 [1] for UTRAN and in TS 43.059 [16] for GERAN.

Table 6.2: Allocation of LCS functional entities to network elements

	UE	**RAN**	**GMLC**	**SGSN**	**MSC/MSC Server**	**HLR/HSS**	**PPR**	**Client**
Location client functions								
LCF	X			X	X			X
LCF Internal	Ffs	X						
Client handling functions								
LCCTF			X					
LCCF			X					
LCAF			X					
System handling functions								
LSCF		X		X	X			
LSBF			X	X	X			
LSOF	X	X	X	X	X			
Subscriber handling functions								
LSAF			X, FFS	X	X		X	
LSPF			X, FFS	X	X	X	X	
Positioning functions								
PRCF		X						
PCF	X	X						
PSMF	X	X						
PRRM		X						
	UE	**RAN**	**GMLC**	**SGSN**	**MSC/MSC Server**	**HLR/HSS**	**PPR**	**Client**

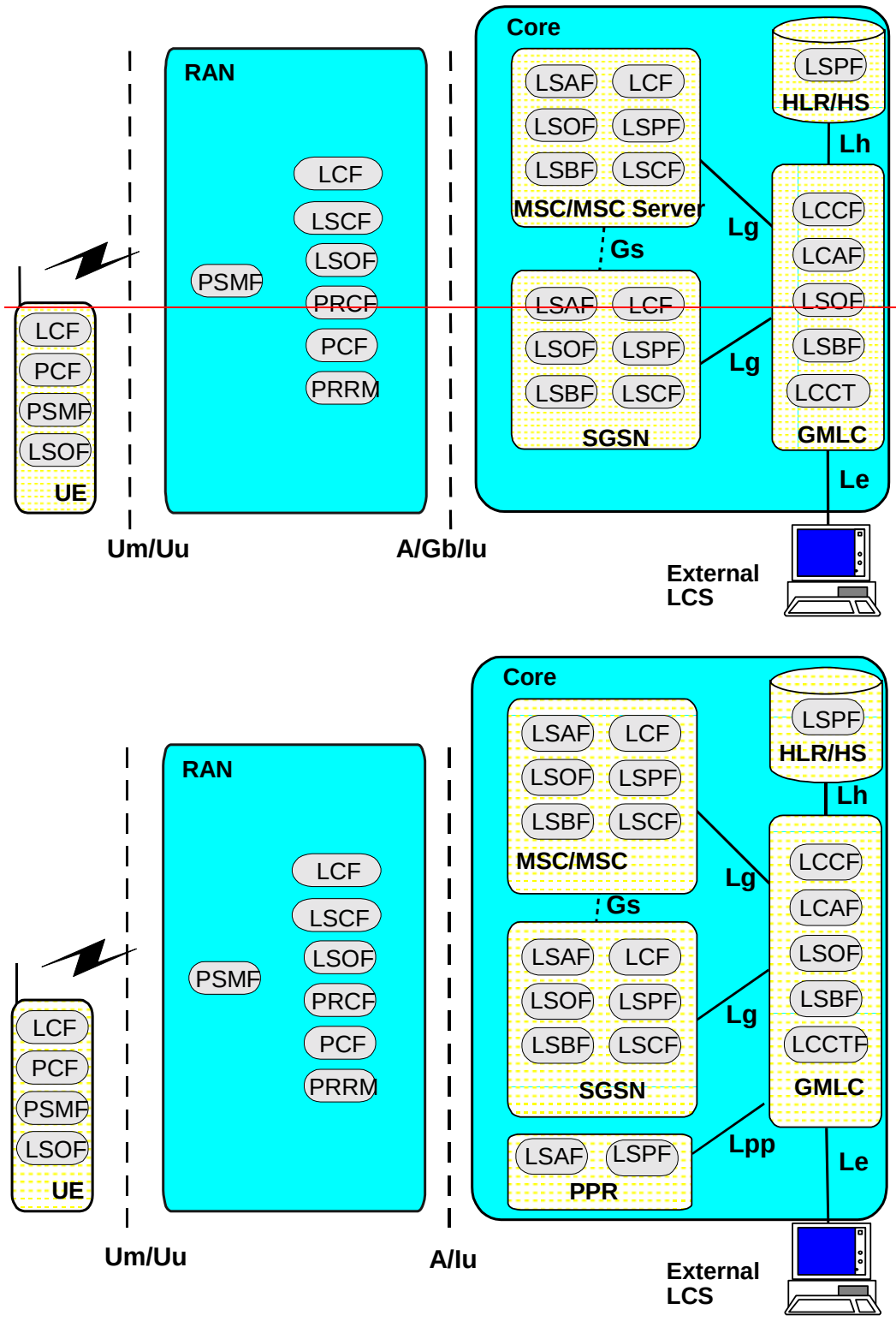


Figure 6.2: Generic LCS Logical Architecture

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

***** NEXT ADDED SECTION *****

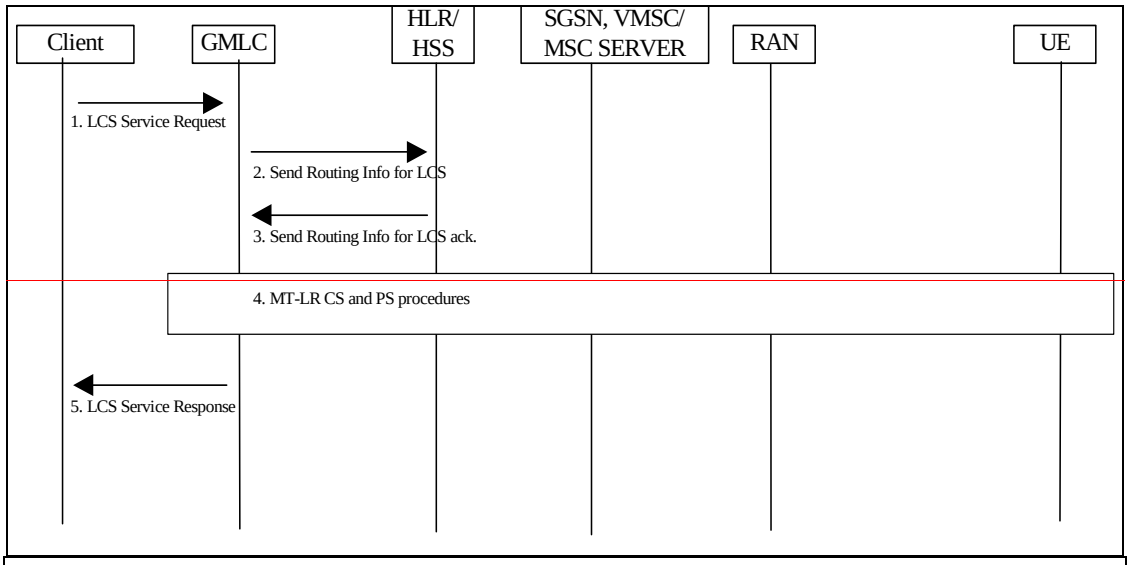
6.3.11 Privacy Profile Register, PPR

Privacy check may be done in the privacy profile register. The HLR or HSS contains the address to the PPR. The PPR is accessible from the H-GMLC via the Lpp interface. PPR may be a standalone network entity or the PPR functionality may be integrated in H-GMLC.

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

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain



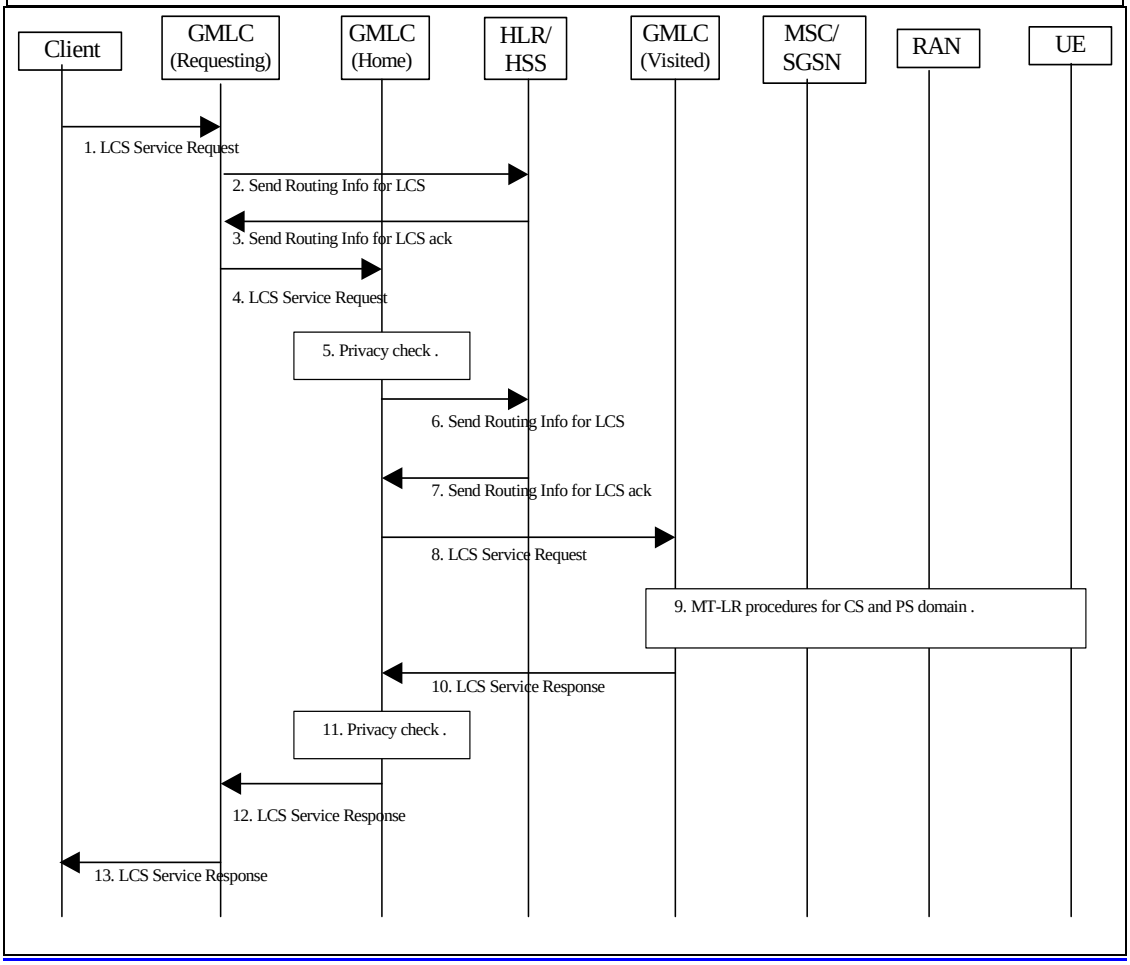


Figure 9.1: General Network Positioning for a MT-LR

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 R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the R-GMLC obtains and authenticates the called party number of the LCS client.
For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. The R-GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the R-GMLC shall reject the LCS request. Otherwise, the R-GMLC can map the received service identity in a corresponding service type.
~~If the 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 location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. LCS client should authenticate the Requestor Identity but this is outside the scope of this specification.

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

~~2) If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the list of codeword for the target UE is stored in the GMLC, this step and step 3 may be skipped. Otherwise, the GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE. When a LCS client type is different from "value added" or the GMLC stores the list of codeword for the target UE, an indication may be sent to the HLR/HSS, in order to inform the HLR/HSS that the codeword is not applicable.~~

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

~~3) The HLR/HSS verifies that the calling party SCCP address of the GMLC corresponds to a known GSM/UMTS network element that is authorized to request UE location information. The HLR/HSS then returns one or several of the addresses, the current SGSN and/or VMSC/MSC server and whichever of the IMSI and MSISDN was not provided in step (2) for the particular UE.~~
   ~~Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the MS's capabilities for LCS. Other priority criteria are for further study.~~

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

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

~~NOTE: This handling allows the HPLMN to reject LCS requests when the VPLMN which the target subscriber is located does not support the Rel-5 Enhanced User Privacy mechanisms, in order to fully protect the user privacy.~~The R-GMLC verifies whether it stores the privacy profile of the target UE. If the R-GMLC stores the UE's privacy profile, (this means the R-GMLC is the H-GMLC of the target UE), then step 2, 3, 4 and 12 are skipped.
If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.

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

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

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

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

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

5) The H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client.

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. The HLR/HSS then returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes and whichever of the IMSI and MSISDN was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return the address of the V-GMLC, if available..

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

8) The GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1 or if the GMLC stores the UE's privacy profile, ~~T~~the H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).
If the H-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the H-GMLC address, the H-GMLC may forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN for the target UE. The forwarded location request may also carry the requested action of the VPLMN as the result of the privacy check in the H-GMLC (e.g. by using the pseudo-external identity as described in Annex X). The V-GMLC first authenticates that the location request is allowed from this

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

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

~~4) In case GMLC~~9) In case the GMLC (H-GMLC, R-GMLC or V-GMLC) receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure only shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (ex. ~~MS~~UE available) in requested PS/CS-MT-LR, see 9.1.8.

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

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

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

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

~~5) GMLC~~13)R-GMLC sends the location service response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.

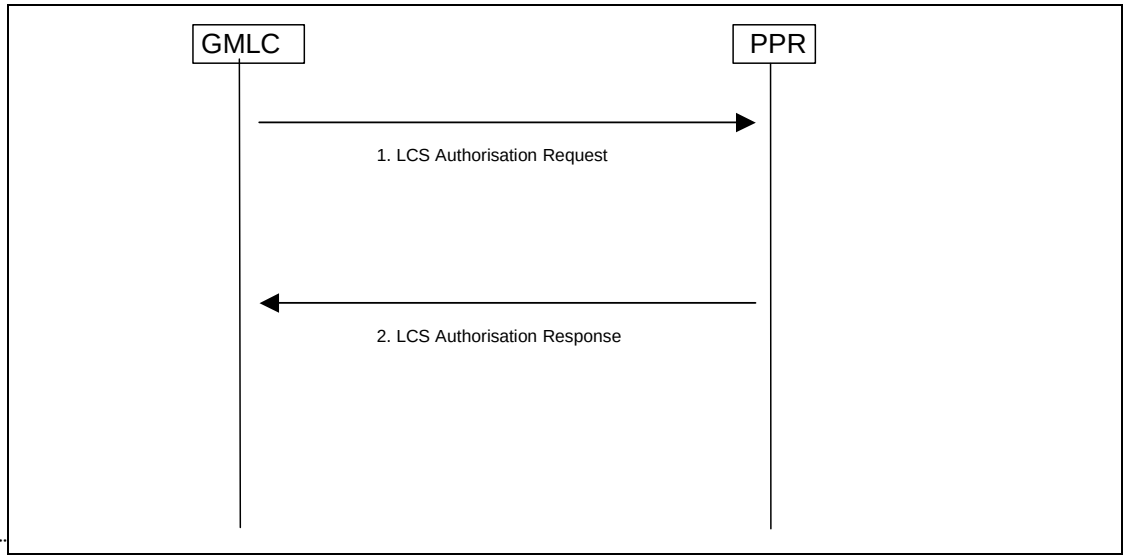
The detailed CS-MT-LR and PS-MT-LR procedures in step 4 of figure 9.1 are described in 9.1.2 and 9.1.6.

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

***** NEXT ADDED SECTION *****

9.1.1.1 LCS Authorisation request

If the UE subscribers LCS privacy information is kept in the PPR the GMLC (H-GMLC) shall send a LCS Authorisation request.



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

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

2) PPR performs the privacy check based on the target UE's privacy profile. The result of that privacy check is send to GMLC in the LCS Authorisation response. If requested by the GMLC the PPR shall include two privacy check results for the LCS Authorisation response, both call/session related and call/session unrelated privacy check results. The response may also contain information is an additional privacy check needed when the GMLC has received the location information of the target UE (e.g. if target UE allows its location information to LCS clients when it is located in certain areas).

   In case subscriber want's to be located in visited networks which have certain capabilities, then this information is also included in the LCS Authorisation Response.

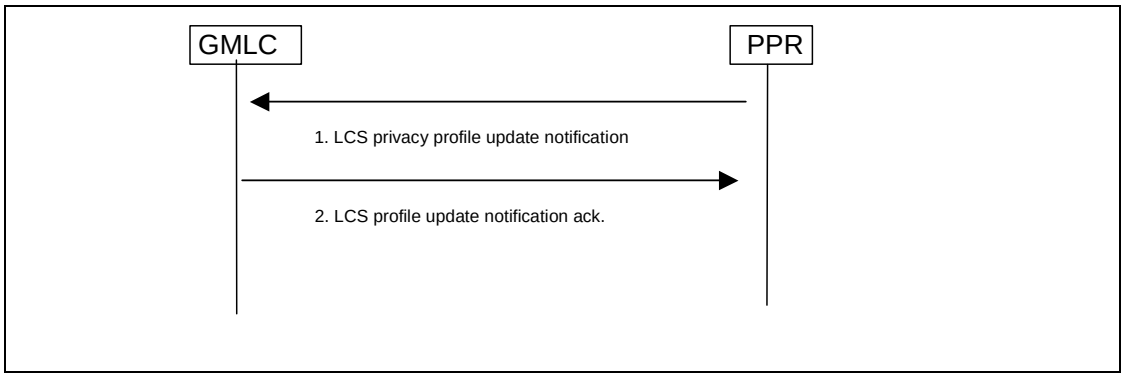
   If PPR received information that the visited MSC/SGSN is pre Rel-6 it shall convert the external LCS client ID in to a pseudo external ID which shall carry the response of the privacy check. More information on pseudo external IDs see Annex C.

   In case the subscriber changed his privacy information the LCS authorisation response shall be also used to indicate this to the GMLC.

***** NEXT ADDED SECTION *****

9.1.1.2 LCS Privacy Profile Update

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



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

2) GMLC acknowledges that it received the notification

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

9.1.8.4 Cancellation of a Deferred Location Request

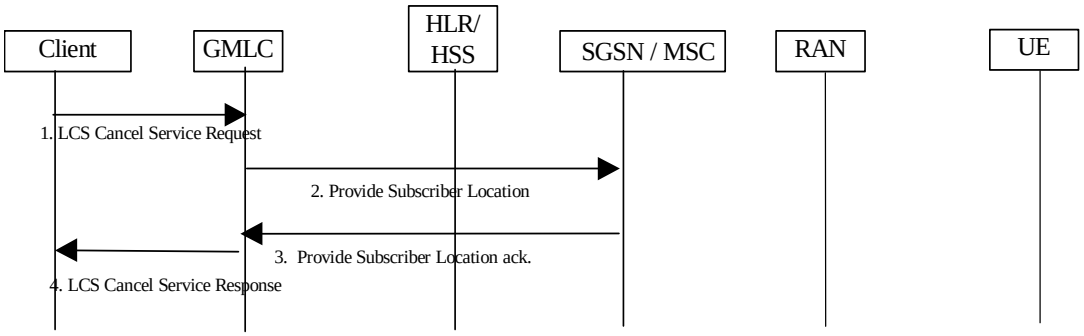


Figure 9.6c: Cancellation of a Deferred MT-LR procedure

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

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

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

2) The GMLC will indicate this cancellation request in the Provide Subscriber Location toward the SGSN/MSC.

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

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

   completed.

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

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

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

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

[In case that UE's privacy profile is stored and is checked in the GMLC (H-GMLC) or in the PPR, pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.1. The pseudo-external identity is not the identity of real external LCS client but the identity which is used for notifying SGSN/MSC of the location request class (call/session related or non-related) and the required type of indication for each class. Operator allocates E.164 addresses for the pseudo-external identities.

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

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

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

The GMLC (H-GMLC) or PPR may store LCS UE subscription data.

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

The GMLC/PPR may store a list of Codewords given by the UE subscriber, to be provided by the LCS client in order not to get the location request rejected.
LCS UE subscription data includes a privacy exception list containing the privacy classes for which location of the target UE is permitted. Each privacy class is treated as a distinct supplementary service with its own supplementary service code. The following logical states are applicable to each privacy class (refer to TS 23.011 [22] for an explanation of the notation).

Table 10.9: Logical States for each LCS Privacy Class

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

For each LCS privacy class, the GMLC/PPR shall store the logical state of the class on a per-subscriber (or per subscriber MSP) basis. In addition, the permanent data indicated in Table 10.10 may be stored on a per subscriber (or per subscriber MSP) basis when the logical provisioning state of the associated LCS privacy class is "provisioned". For the meaning of each LCS privacy class, refer to clause 9 and to TS 22.071 [4].
Moreover a list of allowed service types may be stored. The meaning of service types is defined in TS 22.071 [4].

~~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.~~

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

Table 10.10: LCS data stored in the GMLC/PPR privacy exception list for an UE Subscriber (or UE Subscriber MSP)

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

		• O&M LCS client in the VPLMN • LCS client recording anonymous location information • LCS Client supporting a bearer service, teleservice or supplementary service to the target UE

Table 10.11: LCS Service types stored in the GMLC per UE subscriber

Service type indication	Status	Additional HLR data when the indication is stored
Service Types	O	Indication of one of the following mutually exclusive options for any service type not in the service type list: • Location not allowed (default case) • Location allowed with notification • Location with notification and privacy verification; location allowed if no response • Location with notification and privacy verification; location restricted if no response Service types list: a list of one or more service types for which the LCS client is allowed to locate the particular UE. The possible service types are defined in 22.071. • Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country •Indication of one of the following mutually exclusive options: - Location allowed without notification (default case) - Location allowed with notification - Location with notification and privacy verification; location allowed if no response Location with notification and privacy verification; location restricted if no response

In case that UE's privacy profile is stored and is checked in the GMLC (H-GMLC) or in the PPR, the GMLC/PPR shall store the same pseudo-external identity table with HLR, which is shown in Annex C.

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

Annex C(Informative): ~~(void)~~Pseudo external ID

(~~void~~)

In case that UE's privacy profile is stored and is checked in the GMLC (H-GMLC) or in the PPR, pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.1. The pseudo-external identity is not the identity of real external LCS client but the identity which is used for notifying SGSN/MSC of the location request class (call/session related or non-related) and the required type of indication for each class. Operator allocates E.164 addresses for the pseudo-external identities.

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

Table C.1: Pseudo-external identities

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

3GPP TSG-SA2 Meeting #26 *Tdoc ⌘S2-022462*
Toronto, Canada, 19th – 23rd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **CR81** ⌘**rev** **7** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 9: General Network Positioning Procedures
Source:	⌘	SA2 LCS drafting session
Work item code:	⌘	LCS2-GMLC
Date:	⌘	22/08/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	Definition of the Stage 2 LCS information flows between GMLCs across the Lr interface, in accordance with LCS Work Item.
Summary of change:	⌘	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:	⌘	9.1.1, 9.1.8.4			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 29.002
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

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

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

9.1.1 MT-LR routing procedure in PS and CS domain

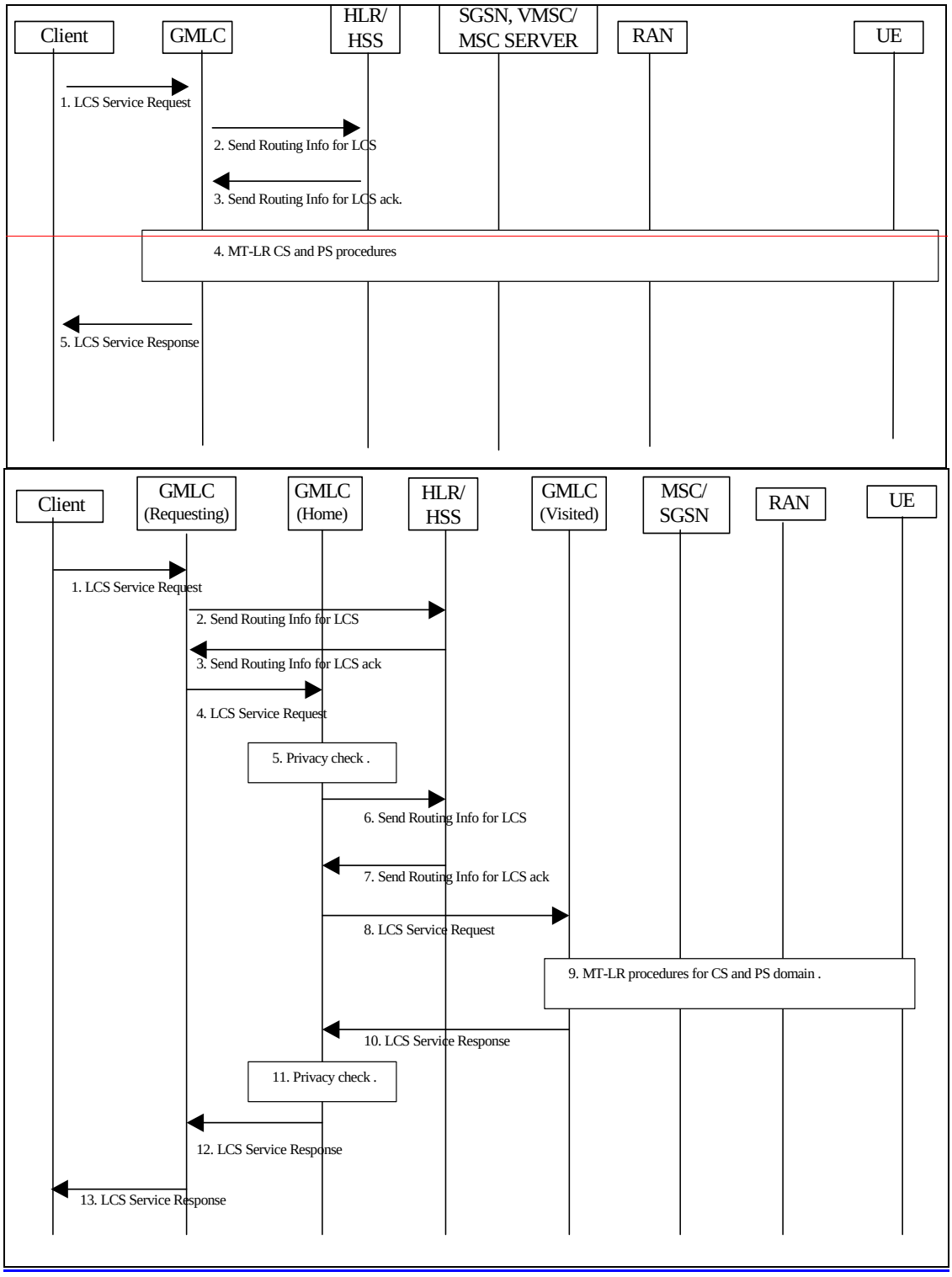

Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be

located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the R-GMLC obtains and authenticates the called party number of the LCS client.
For a session related location request, the R-GMLC obtains and authenticates the APN-NI of the LCS client.
The LCS request may carry also the Service Identity and the Codeword. The R-GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the R-GMLC shall reject the LCS request. Otherwise, the R-GMLC can map the received service identity in a corresponding service type.
~~If the 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 location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. LCS client should authenticate the Requestor Identity but this is outside the scope of this specification.

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

~~2) If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the list of codeword for the target UE is stored in the GMLC, this step and step 3 may be skipped. Otherwise, the GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE. When a LCS client type is different from "value added" or the GMLC stores the list of codeword for the target UE, an indication may be sent to the HLR/HSS, in order to inform the HLR/HSS that the codeword is not applicable.~~

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

~~3) The HLR/HSS verifies that the calling party SCCP address of the GMLC corresponds to a known GSM/UMTS network element that is authorized to request UE location information. The HLR/HSS then returns one or several of the addresses, the current SGSN and/or VMSC/MSC server and whichever of the IMSI and MSISDN was not provided in step (2) for the particular UE.~~
~~Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the MS's capabilities for LCS. Other priority criteria are for further study.~~

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

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

~~NOTE: This handling allows the HPLMN to reject LCS requests when the VPLMN which the target subscriber is located does not support the Rel-5 Enhanced User Privacy mechanisms, in order to fully protect the user privacy.~~The R-GMLC verifies whether it stores the privacy profile of the target UE. If the R-GMLC stores the UE's privacy profile, (this means the R-GMLC is the H-GMLC of the target UE), then step 2, 3, 4 and 12 are skipped.

If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.

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

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

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

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

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

5) The H-GMLC verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred and the LCS client does not have the override capability, an error response is returned to the R-GMLC or the LCS client.

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

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

7) The HLR/HSS verifies the network address of the H-GMLC in order to check that the H-GMLC is authorized to request UE location information. The HLR/HSS then returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes and whichever of the IMSI and MSISDN was not provided in step (2) or (6) for the particular UE. The HLR/HSS may also return the address of the V-GMLC, if available..

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

8) The H-GMLC may perform privacy check on the basis of the UE user's privacy profile and the capabilities of the serving nodes (MSC/VLR and/or SGSN).
If the H-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the H-GMLC address, the H-GMLC may forward the location request to the V-GMLC. The forwarded location request shall contain, one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN for the target UE. The forwarded location request may also carry the requested action of the VPLMN as the result of the privacy check in the H-GMLC (e.g. by using the pseudo-external identity as described in Annex X). The V-GMLC first authenticates that the location request is allowed from this PLMN or from this country. If not, an error response is returned.
In the cases when the H-GMLC did not receive the address of the V-GMLC, when the V-GMLC address is the same with the H-GMLC address or when both PLMN operators agree not to use Lr interface, the H-GMLC does not forward the location request to the V-GMLC and step 10 is skipped.

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

~~4) In case GMLC~~9) In case the GMLC (H-GMLC, R-GMLC or V-GMLC) receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure only shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (ex. ~~MS~~UE available) in requested PS/CS-MT-LR, see 9.1.8.

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

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

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

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

~~5) GMLC~~13) R-GMLC sends the location service response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.

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

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

<<<Next change>>>

9.1.8.4 Cancellation of a Deferred Location Request

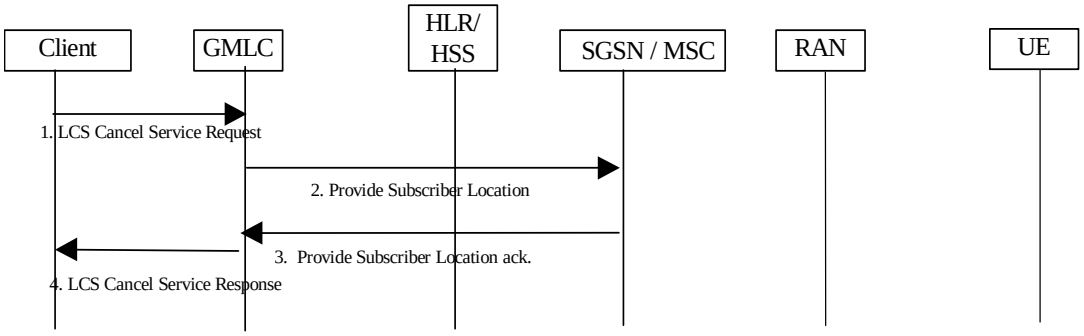

Figure 9.6c: Cancellation of a Deferred MT-LR procedure

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~~expired.) If the UE's privacy profile stored in the H-GMLC was changed and the Deferred Location Request shall be cancelled or the requested action for the VPLMN ~~is not allowed any more.).~~shall be changed, the H-GMLC initiates the cancellation and may send a new Deferred Location Request to the VPLMN. The event type to cancel must be indicated in the Cancellation procedure.

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

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).

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

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

3GPP TSG-SA2 Meeting #26 *Tdoc ⌘S2-022315*
Toronto, Canada, 19th – 23rd August 2002

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CHANGE REQUEST

⌘ **23.271** **CR** **111** ⌘**rev** **-** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 3, 5 and 6: Abbreviations, General LCS Architecture and LCS Architecture
Source:	⌘	NEC, NTT DoCoMo, (SA2 LCS session)
Work item code:	⌘	LCS2-GMLC
Date:	⌘	09/08/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	Definition of the Stage 2 LCS information flows between GMLCs across the Lr interface, in accordance with LCS Work Item.
Summary of change:	⌘	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:	⌘	3.2, 5.6, 6.2, 6.3.3, 6.3.5, 6.3.7				
Other specs affected:	⌘	**Y**	**N**			
		X		Other core specifications	⌘	29.002
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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

3.2 Symbols

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

Gb	Interface between 2G-SGSN and BSS
Gs	Interface between MSC and SGSN
Lc	Interface between gateway MLC and gsmSCF (CAMEL interface)
Le	Interface between External User and MLC (external interface)
Lg	Interface between Gateway MLC - VMSC, GMLC - MSC Server, GMLC - SGSN (gateway MLC interface)
Lh	Interface between Gateway MLC and HLR (HLR interface)
Lr	Interface between Gateway MLCs
Um	GERAN Air Interface
Uu	UTRAN Air Interface

<<<Next change >>>

5.6 Information Flows between LCS Servers

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

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

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

5.6.1 Location Service Request

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

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

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

- Target UE identity;
- LCS Client identity;
- LCS Client name, if needed (and type of LCS client name if available);
- Service type, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Event, applicable to deferred location requests only;
- Requested Quality of Service information, if needed;
- Type of location, i.e. current location or last known location;
- Priority, if needed;
- Privacy override indicator, if needed;

- Supported GAD shapes, if needed;

- Source LCS server identity;

- Address of serving node

Some of the information may be stored in GMLC and the LCS client does not need to include such information in the location service request.

5.6.2 Location Service Response

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

- Immediate Response; or a

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

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

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 or local coordinate system;

- Acknowledgement for a deferred location request, if needed.

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

<<<Next change>>>

6.2 Allocation of LCS functions to network elements

Table 6.1 shows a summary of the Functional Groups and Functional Blocks for Location services. Table 6.2 and figure 6.2 show the generic configuration for LCS and the distribution of LCS functional blocks to network elements. Different positioning methods, including network-based, mobile-based, mobile-assisted and network-assisted positioning methods may be used. With this configuration both the network and the mobiles are able to measure the timing of signals and compute the mobile's location estimate. Depending on the applied positioning method it is possible to utilise the corresponding configuration containing all needed entities. For instance, if network-based positioning is applied, the entities that are involved in measuring the mobile's signal and calculating its location estimate are allocated to the network elements of the access stratum. On the other hand, in case mobile-based or network-assisted methods are used these entities should be allocated to the UE.

LCS is logically implemented on the network structure through the addition of one network node, the Mobile Location Center (MLC). It is necessary to name a number of new interfaces. The LCS generic architecture can be combined to produce LCS architecture variants.

Table 6.1: Summary of Functional Groups and Functional Blocks for Location services

Funct. Group	Functional component	Full name of Functional Block	Abbrev.
Loc. Client	Location Client Component	(External) Location Client Function	LCF
		Internal Location Client Function	LCF -internal
LCS Server in PLMN	Client handling component	Location Client Control Function	LCCF
		Location Client Authorization Function	LCAF
	System handling component	Location System Control Function	LSCF
		Location System Billing Function	LSBF
		Location System Operations Function	LSOF
	Subscr. handling component	Location Subscriber Authorization Function	LSAF
		Location Subscriber Privacy function	LSPF
	Positioning component	Positioning Radio Control Function	PRCF
		Positioning Calculation Function	PCF
		Positioning Signal Measurement Function	PSMF
		Positioning Radio Resource Management	PRRM

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

It is also seen that LCS may take benefit of the Iur interface between RNCs, when uplink radio information and measurement results are collected.

The functional model presented in the figure includes functional entities for both CS and PS related LCS. In addition, it consists of all the entities needed for different positioning methods, i.e. network based, mobile based, mobile assisted, and network assisted positioning, exploiting either uplink or downlink measurements. It is noted that the UE may use e.g. the GPS positioning mechanism, but still demand e.g. auxiliary measurements from the serving network. RAN specific functional entities are specified in TS 25.305 [1] for UTRAN and in TS 43.059 [16] for GERAN.

Table 6.2: Allocation of LCS functional entities to network elements

	UE	RAN	GMLC	SGSN	MSC/MSC Server	HLR/HSS	Client
Location client functions							
LCF	X			X	X		X
LCF Internal	Ffs	X					
Client handling functions							
LCCTF			X				
LCCF			X				
LCAF			X				
System handling functions							
LSCF		X		X	X		
LSBF			X	X	X		
LSOF	X	X	X	X	X		
Subscriber handling functions							
LSAF			X, FFS	X	X		
LSPF			X, FFS	X	X	X	
Positioning functions							
PRCF		X					
PCF	X	X					
PSMF	X	X					
PRRM		X					
	UE	**RAN**	**GMLC**	**SGSN**	**MSC/MSC Server**		**Client**

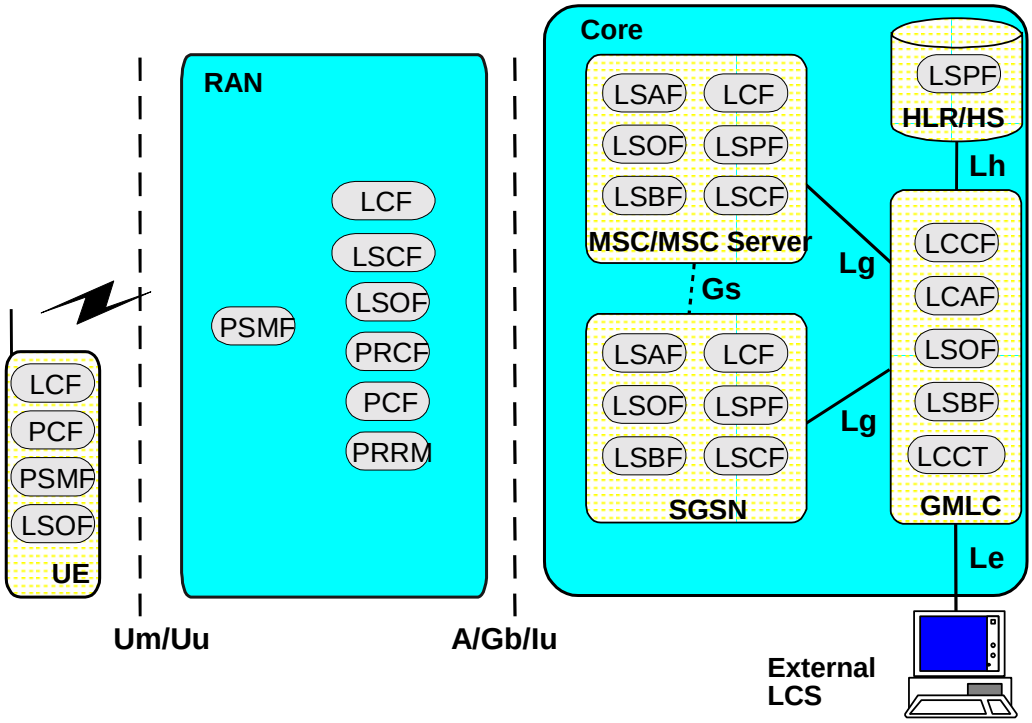

Figure 6.2: Generic LCS Logical Architecture

<<<Next change>>>

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. ~~Optionally,~~Information needed for authorisation, location service requests and location information may be communicated between GMLCs, located in the same or different PLMNs, via the Lr ~~GMLC to GMLC interface.~~

interface. The target UE's privacy profile settings shall always be checked in the UE's home PLMN prior to delivering a location estimate. In order to allow location request from a GMLC outside the HPLMN while having privacy check in the HPLMN, the Lr interface is needed.

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

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

The "Home GMLC" is the GMLC, which is responsible to control the privacy checking of the target mobile.

The Requesting GMLC can be the Visited GMLC, which can be the Home GMLC in the same time.

<<<Next change>>>

6.3.5 MSC/VLR

The MSC/VLR contains functionality responsible for UE subscription authorization and managing call-related and non-call related positioning requests of LCS. The MSC is accessible to the GMLC via the Lg interface. The LCS functions of MSC are related to charging and billing, LCS co-ordination, location request, authorization and operation of the LCS services. If connected to SGSN through the Gs interface, it checks whether the UE is GPRS attached to decide whether to page the UE on the A/Iu or Gs interface.

The MSC/VLR may inform HLR/HSS about the UE's LCS Capabilities and may include the address of the V-GMLC associated with the MSC/VLR in the MAP UPDATE LOCATION message, during Registration and Inter MSC Update Location procedures.

<<<Next change>>>

6.3.7 SGSN

The SGSN contains functionality responsible for UE subscription authorization and managing positioning requests of LCS. The SGSN is accessible to the GMLC via the Lg interface. The LCS functions of SGSN are related to charging and billing, LCS co-ordination, location request, authorization and operation of the LCS services.

The SGSN may inform HLR/HSS about the UE's LCS Capabilities for GPRS and may include the address of the V-GMLC associated with the SGSN in the MAP UPDATE GPRS LOCATION message, during Attach and Inter SGSN Routing Area Update procedures.

The SGSN forwards the circuit-swiched paging request received from the Gs interface to the BSS/RNC.

3GPP TSG-SA2 Meeting #26 *Tdoc ⌘S2-022463*
Toronto, Canada, 19th – 23rd August 2002

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CHANGE REQUEST

⌘ **23.271** **CR** **112** ⌘**rev** **1** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 10.5: Interworking mechanism between network nodes in different releases
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS2-GMLC
Date:	⌘	22/08/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	Interworking mechanisms between network nodes in different releases shall be defined.
Summary of change:	⌘	Interworking mechanisms between network nodes in different releases are defined in clause 10.5.
Consequences if not approved:	⌘	Interworking mechanisms between network nodes in different releases are missed.

Clauses affected:	⌘	10.5			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 29.002
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

10.5 Interworking between network nodes in different releases

This clause describes possible scenarios for interworking between network nodes in different releases.

10.5.1 LCS capability set

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

- LCS ~~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)~~
- LCS capability set 4: Rel'6 or later LCS

~~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 capability set 3, shall support the following capabilities:

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

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

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

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

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

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

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

~~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 by the serving node, ~~-~~it may decide not to ~~not~~ send the LCS subscriber data to the serving node, in order to protect user privacy.

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

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

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

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

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

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

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

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

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

[Note: this interworking scenario can be also applied for PS domain. Generalization of the description in this sub clause to cover both CS and PS domain should be done.][Note2: the concept of LCS capability set is ~~newly~~ introduced in Rel4 so that it doesn't appear in the specifications for R98 and R99 LCS]

3GPP TSG-SA2 Meeting #26 *Tdoc ⌘S2-022464*
Toronto, Canada, 19th – 23rd August 2002

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CHANGE REQUEST

⌘ **23.271** **CR** **113** ⌘**rev** **1** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Introduction of the GMLC - GMLC Lr (roaming) interface: – Clause: 9.1.2/9.1.6: CS-MT-LR/PS-MT-LR Procedures
Source:	⌘	NEC, NTT DoCoMo
Work item code:	⌘	LCS2-GMLC
Date:	⌘	13/08/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	In Rel-6, the privacy check is performed in H-GMLC. Therefore the privacy check procedures in the Rel-6 serving nodes are not needed, when the privacy check is performed in the H-GMLC.
Summary of change:	⌘	The privacy check procedures in the Rel-6 serving nodes are skipped, when the GMLC indicates the privacy check was performed in the GMLC.
Consequences if not approved:	⌘	Stage 2 description of GMLC – GMLC Lr interface will be incomplete.

Clauses affected:	⌘	9.1.2, 9.1.6			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 29.002
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

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.

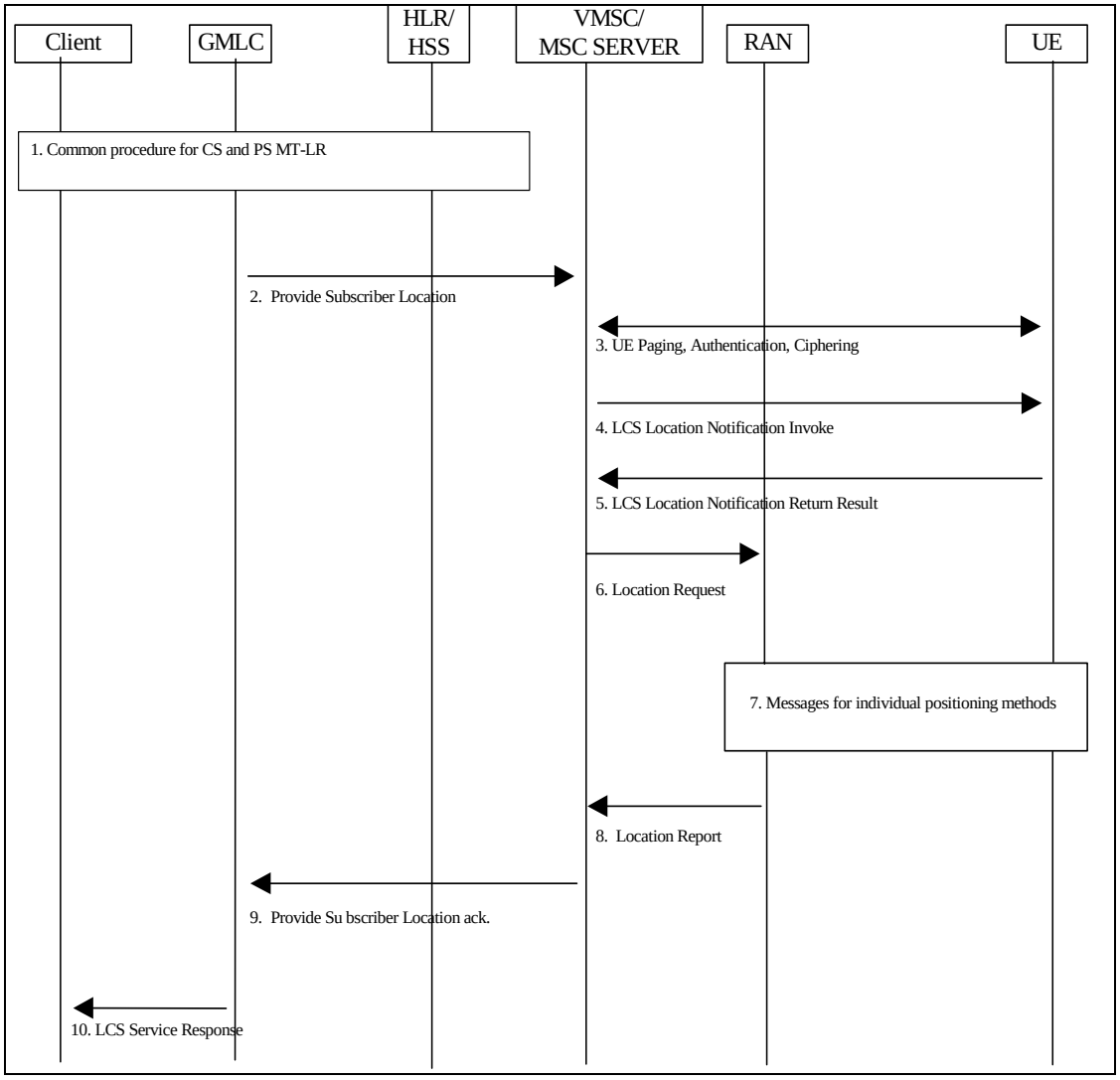

Figure 9.2: Network Positioning for a CS-MT-LR

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

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

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

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

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

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

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

5) The target UE notifies the UE user of the location request. If privacy verification was requested, the target UE indicates to the UE user whether the location request will be allowed or not allowed in the absence of a response and waits for the user to grant or withhold permission. The UE then returns an LCS Location Notification Return Result to the VMSC/MSC server indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, the LCS Location Notification Return Result message can be returned some time after

step 4, but before step 9. If the UE user does not respond after a predetermined time period, the VMSC/MSC server shall infer a "no response" condition. The VMSC/MSC server shall return an error response to the GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request in the absence of a response.

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

9.1.2.2 Positioning Measurement Establishment Procedure

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

9.1.2.3 Location Calculation and Release Procedure

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

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

10) The GMLC returns the UE location estimate to the requesting LCS client as described in chapter 9.1.1.

<< Next Change >>

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

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

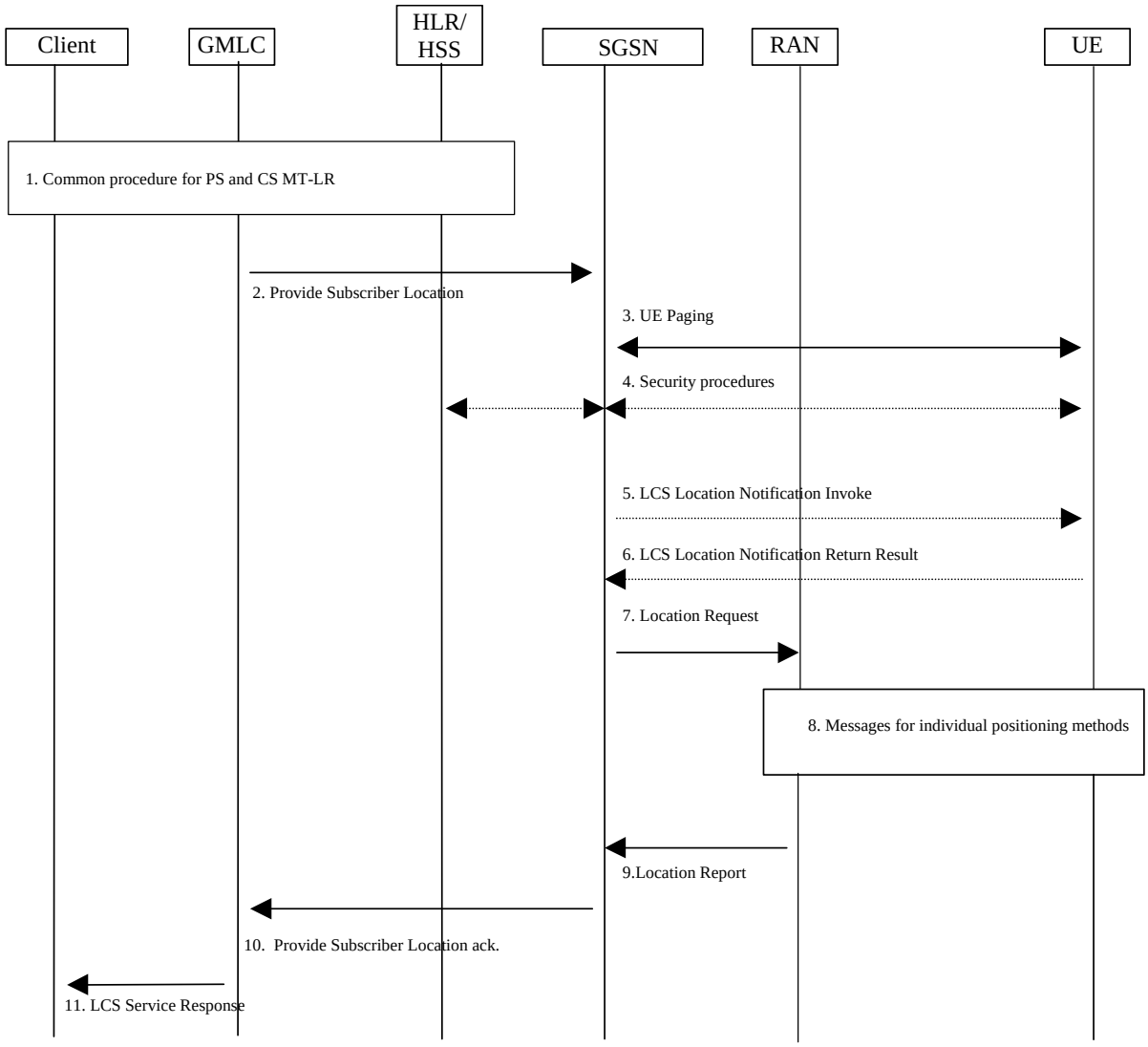

Figure 9.5: General Network Positioning for Packet Switched MT-LR

9.1.6.1 Location Preparation Procedure

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

2) GMLC sends a Provide Subscriber Location message to the SGSN indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a session related location request, the message also carries the APN-NI to which the user has established the session. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available), optionally the message may also carry the Service Type. If the HLR/HSS indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5

network elements (i.e. SGSN and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. The message also shall carry the indication of the requested privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) in the SGSN, which is provided by H-GMLC.

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

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

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

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

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

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

9.1.6.2 Positioning Measurement Establishment Procedure

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

9.1.6.3 Location Calculation and Release Procedure

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

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

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

3GPP TSG-SA2 Meeting #25
Naantali, Finland, 24.–28.06.2002

Tdoc ⌘S2-021917
Revised S2-021907, S2-021790

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **105** ⌘**rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Type indicator for LCS client name and Requestor identity
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	18/06/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	LCS client name and Requestor ID could be presented in several different types. Therefore it would be useful for the target UE to know exact type of the LCS client name and Requestor ID when it performs some operations.
Summary of change:	⌘	Include the type of the LCS client name and Requestor ID to LCS service request, Provide Subscriber Location and LCS Location notification Invoke procedures.
Consequences if not approved:	⌘	Target UE can not be sure what is the type of the LCS client name and the Requestor ID

Clauses affected:	⌘	2.1, 5.5.1, 6.3.2, 9.1.1, 9.1.2, 9.1.6, 10.3.1 and Annex B

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications		29.002, 24.080, 24.030
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

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

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

<< First changed section >>

2.1 Normative references

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

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

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

<< Next changed section >>

5.5.1 Location Service Request

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

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

The attributes for the information exchange between the LCS Client and the LCS Server have been standardized by LIF based on requirements set by TS 22.071 and TS 23.271.

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

- Target UE identity;
- LCS Client identity;
- Service identity, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Event, applicable to deferred location requests only;
- Start time, stop time and interval, applicable to periodical and deferred requests only;
- Requested Quality of Service information, if needed;
- Type of location, i.e. current location or last known location;
- Priority, if needed;
- Local coordinate reference system, if needed;
- Geographical area, if needed.

Some of the information may be stored in GMLC and the LCS client does not need to include such information in the location service request.

<< Next changed section >>

6.3.2 LCS Clients, LCS applications and Requestors

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

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

- Logical name
- MSISDN [17]
- E-mail address[33]
- URL[33]
- SIP URL[34]
- IMS public identity[35]

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

<< Next changed section >>

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

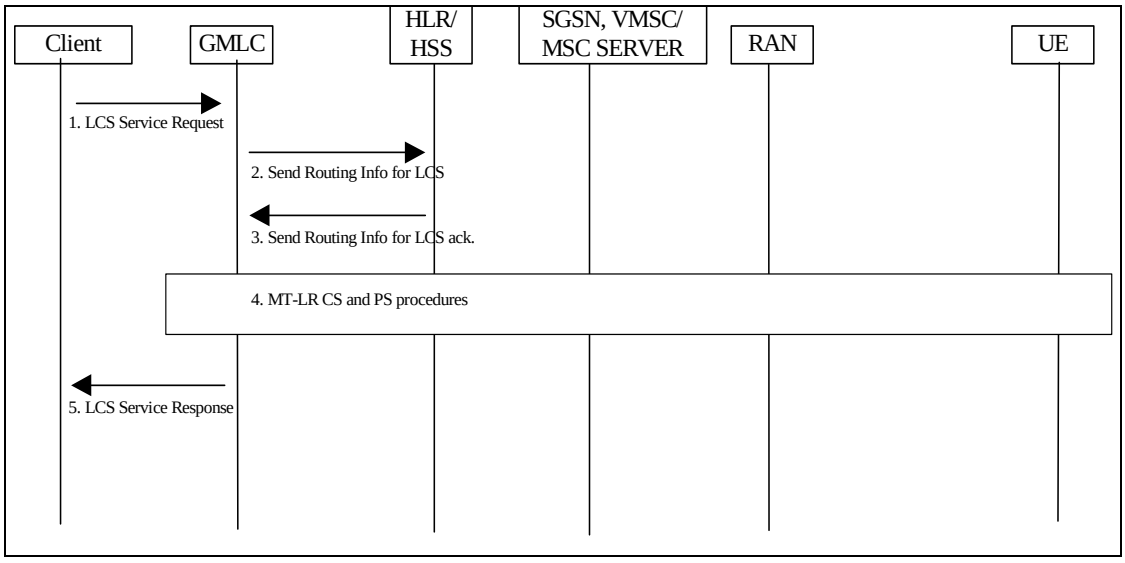

Figure 9.1: General Network Positioning for a MT-LR

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.

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

   The LCS service request may~~shall~~ also contain the ~~format of the LCS client name and also the type~~~~format~~ of the Requestor identity if the requestor identity was included.

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

2) If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the list of codeword for the target UE is stored in the GMLC, this step and step 3 may be skipped. Otherwise, the GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE. When a LCS client type is different from "value added" or the GMLC stores the list of codeword for the target UE, an indication may be sent to the HLR/HSS, in order to inform the HLR/HSS that the codeword is not applicable.

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

3) The HLR/HSS verifies that the calling party SCCP address of the GMLC corresponds to a known GSM/UMTS network element that is authorized to request UE location information. The HLR/HSS then returns one or several of the addresses, the current SGSN and/or VMSC/MSC server and whichever of the IMSI and MSISDN was not provided in step (2) for the particular UE.
   Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the MS's capabilities for LCS. Other priority criteria are for further study.

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

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

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

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

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

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

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

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

<< Next changed 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.

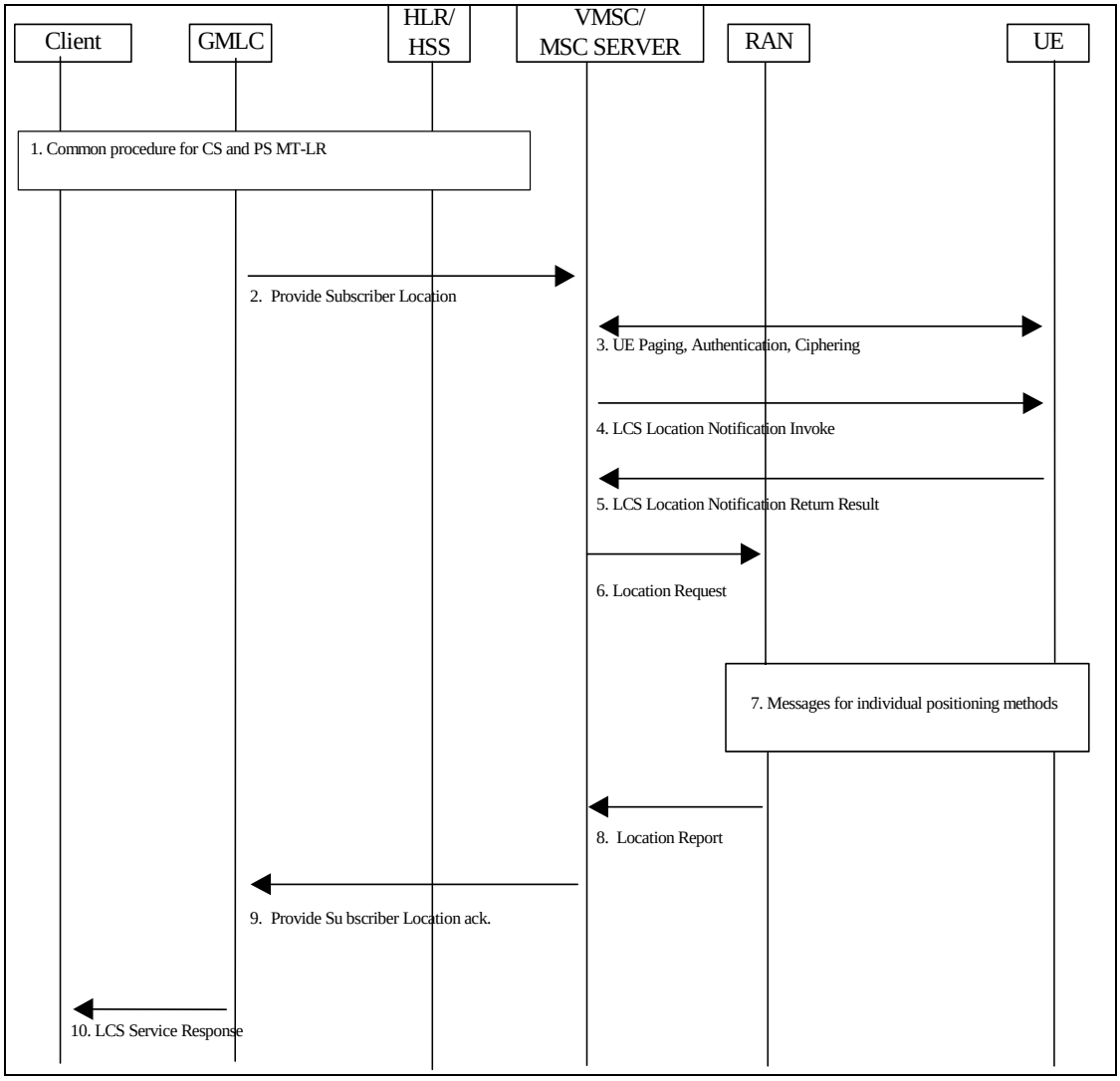

Figure 9.2: Network Positioning for a CS-MT-LR

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). Also the message ~~shall~~may carry the type~~format~~ of the LCS client name and also the type~~format~~ of the Requestor identity if the requestor identity was included. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. Moreover the message may also carry the Service Type**.** If the HLR/HSS indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. MSC and/or UE), the requestor identity may be also added to the LCS client name by the GMLC.

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. Also the message ~~shall~~may indicate the type~~format~~ of the LCS client name and also the type~~format~~ of the Requestor identity if the requestor identity was included. Moreover, the message may carry also the service type and the codeword.

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

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

5) The target UE notifies the UE user of the location request. If privacy verification was requested, the target UE indicates to the UE user whether the location request will be allowed or not allowed in the absence of a response and waits for the user to grant or withhold permission. The UE then returns an LCS Location Notification Return Result to the VMSC/MSC server indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, the LCS Location Notification Return Result message can be returned some time after step 4, but before step 9. If the UE user does not respond after a predetermined time period, the VMSC/MSC

server shall infer a "no response" condition. The VMSC/MSC server shall return an error response to the GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request in the absence of a response.

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

9.1.2.2 Positioning Measurement Establishment Procedure

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

9.1.2.3 Location Calculation and Release Procedure

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

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

10) The GMLC returns the UE location estimate to the requesting LCS client as described in chapter 9.1.1.

<< Next changed 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.

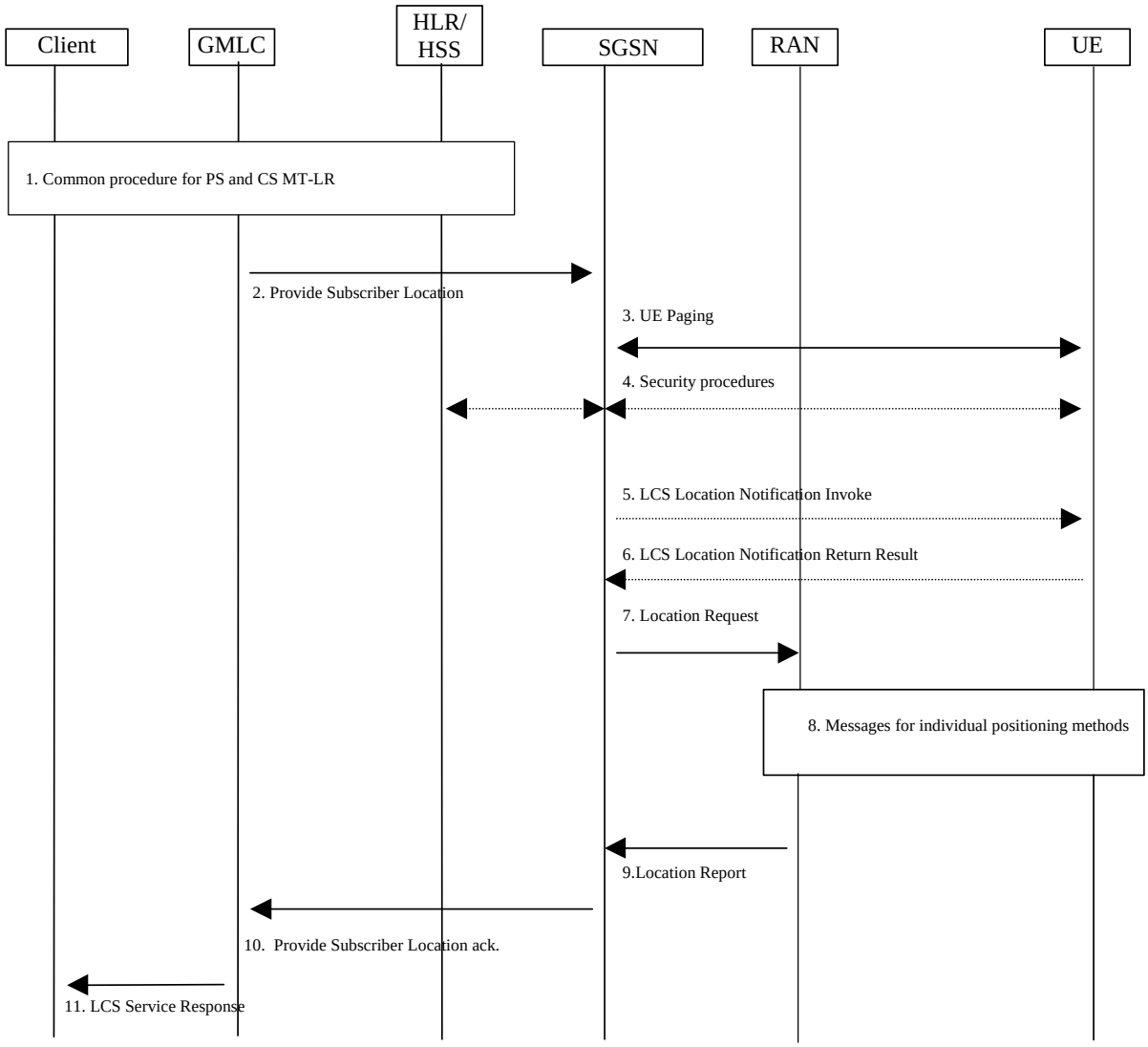

Figure 9.5: General Network Positioning for Packet Switched MT-LR

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. Also the message ~~shall~~may carry the type~~format~~ of the LCS client name and also the type~~format~~ of the Requestor identity if the requestor identity was included. If the HLR/HSS indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client.

If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. SGSN and/or UE), the requestor identity may be also added to the LCS client name by the GMLC.

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. Also the message ~~shall~~may indicate the type~~format~~ of the LCS client name and also the type~~format~~ of the Requestor identity if the requestor identity was included. Moreover, the message may carry also the service type and the codeword. Optionally, the SGSN may after sending the LCS Location Notification Invoke message continue in parallel the location process, i.e. continue to step 7 without waiting for a LCS Location Notification Return Result message in step 6.

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

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

9.1.6.2 Positioning Measurement Establishment Procedure

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

9.1.6.3 Location Calculation and Release Procedure

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

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

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

<< Next changed section >>

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).
Client name type	O	Indication what is the type of the LCS client name. The type of the LCS client name can be one of the following: • Logical name • MSISDN • E-mail address[33] • URL[33] • SIP URL[34] • IMS public identity[35]
Override capability	O	Indication of whether the LCS client possesses the override capability (not applicable to a value added and PLMN operator service)
Authorized UE List	O	A list of MSISDNs or groups of MSISDN for which the LCS client may issue a non-call related MT-LR. Separate lists of MSISDNs and groups of MSISDN may be associated with each distinct external or non-call related client identity.
Priority	M	The priority of the LCS client – to be treated as either the default priority when priority is not negotiated between the LCS server and client or the highest allowed priority when priority is negotiated
QoS parameters	M	The default QoS requirements for the LCS client, comprising: - Accuracy - Response time Separate default QoS parameters may be maintained for each distinct LCS client identity (external, non-call related, call related)

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.

<< Next changed section >>

Annex B (normative): Presence of LCS client ID Components in MT-LR

The LCS client identity is composed of one or more than one of the following components: LCS client type, external identity, internal identity, call/session related identity, APN-NI, client name and Requestor Identity. For Value added LCS client type it may contain also Client name and Requestor ID type indicator. The LCS client type shall always be present and for each LCS client type the presence of the other components are defined as follows:

Component LCS Client type	External identity	Internal identity	Call/session related identity	Client name	Requestor Identity
Emergency	O	N.A.	N.A.	N.A.	N.A.
Value added	M	N.A.	O [Note]	M	O
PLMN operator	N.A.	M	N.A.	N.A.	N.A.
Lawful Intercept	N.A.	N.A.	N.A.	N.A.	N.A.

Note: This component shall be present if the MT-LR is associated to either CS call or PS session. If the MT-LR is associated with the CS call, the number dialled by UE is used. Otherwise if the MT-LR is associated with the PS session, the APN-NI is used.