3GPP TSG-SA Meeting #26 **TSGS#26(04)0760**
13th – 16th December 2004. Athens, Greece.

Source: **TSG SA WG2**
Title: **CRs on 23.271 (Location Services Stage 2)**
Agenda item: **7.2.3**
Document for: **APPROVAL**

The following CRs have been agreed by TSG SA WG2 and are requested to be approved by TSG SA plenary #26.

Note: *the source of all these CRs is now SA2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.*

Tdoc	Title	Spec	CR	Rev	Cat	C_Ver	Rel	WI
S2-043192	Resolving invalid references	23.271	281		F	4.12.0	Rel-4	LCS2
S2-043286	Resolving invalid references	23.271	282	1	F	5.12.0	Rel-5	LCS2
S2-043287	Resolving invalid references	23.271	283	1	F	6.9.0	Rel-6	LCS2
S2-043321	Service Type checking corrections	23.271	285	1	F	6.9.0	Rel-6	LCS2
S2-043238	Privacy mechanism at deferred location request – UE available event	23.271	286		F	6.9.0	Rel-6	LCS2
S2-043322	QoS Class at Deferred Location Request	23.271	287	1	F	6.9.0	Rel-6	LCS2
S2-043853	Correction on the Figure A.2	23.271	288	2	F	6.9.0	Rel-6	LCS2
S2-043754	Correction in the section 7.1.1	23.271	289	1	F	6.9.0	Rel-6	LCS2
S2-043855	Clarifications on the LCS authorisation response	23.271	290	2	F	6.9.0	Rel-6	LCS2
S2-043898	Delete new address of MSC/SGSN from Subscriber Location Report	23.271	292	3	F	6.9.0	Rel-6	LCS2
S2-043740	NA-ESRD Provision for NI-LR Location Based Routing in North America	23.271	294	1	F	6.9.0	Rel-6	LCS2
S2-043757	POI applicability	23.271	295	1	F	6.9.0	Rel-6	LCS2

3GPP TSG-SA2 Meeting #42 **Tdoc ⌘S2-043192**
Sophia Antipolis, France, 11 -15 October 2004

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **281** ⌘**rev** **-** ⌘ Current version: **4.12.0** ⌘

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

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

Title:	⌘	Resolving Invalid References
Source:	⌘	Vodafone (Rapporteur)
Work item code:	⌘	LCS2
Date:	⌘	28/09/2004
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:	⌘	At the request of MCC to remove invalid references.
Summary of change:	⌘	Remove invalid references to specifications in previous releases. Add reference numbers where missing And a number of editorial changes where the section is modified already.
Consequences if not approved:	⌘	Incorrect referencing

Clauses affected:	⌘	2.1, 3.1, 3.3, 4.3.1, 4.3.2, 9.1.6.2, 10.3

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

⌘

Other comments:	⌘	

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Below is a brief summary:

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

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

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

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

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

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

2.1 Normative references

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

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

[3] 3GPP TS 21.905: "~~UMTS Abbreviations and acronyms~~Vocabulary for 3GPP Specifications".

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

[5] (void)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[26] 3GPP TS 23.127: "Virtual Home Environment".

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

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

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

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

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

3.1 Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Target UE: UE being positioned

User Equipment: term 'User Equipment', or 'UE'~~, should for GSM be interpreted as 'MS',~~ as defined in ~~GSM~~ 3GPP TS ~~04.02~~21.905 [~~19~~3]. UE in this specification may also refer to a Mobile Equipment or User Equipment used for emergency calls, that do not have valid SIM or USIM

Further UMTS related definitions are given in 3GPP TS 22.101 [8].

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

3.3 Abbreviations

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

2G-	Second Generation
3G-	Third Generation
AC	Admission Control
AI	Application Interface (prefix to interface class method)
ANM	Answer Message (ISUP)
APN	Access Point Name
APN-NI	APN Network Identifier
ARIB	Association of Radio Industries and Business
ATD	Absolute Time Difference
BCCH	Broadcast Control Channel
BER	Bit Error Rate
BSS	Base Station Subsystem
BTS	Base Transceiver Station
CAMEL	Customised Application For Mobile Network Enhanced Logic
CAP	CAMEL Application Part
CM	Connection Management
CN	Core Network
CSE	Camel Service Environment
DL	Downlink
DRNC	Drift RNC
E-OTD	Enhanced Observed Time Difference
FER	Frame Error Rate
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMLC	Gateway MLC
GPRS	General Packet Radio Service
GPS	Global Positioning System
HE	Home Environment
HLR	Home Location Register
HPLMN	Home Public Land Mobile Network
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity

IP	Internet Protocol
IPDL	Idle Period Downlink
LA	Location Application
LAF	Location Application Function
LBS	Location Based Services
LCAF	Location Client Authorization Function
LCCF	Location Client Control Function
LCCTF	Location Client Co-ordinate Transformation Function
LCZTF	Location Client Zone Transformation Function
LCF	Location Client Function
LCS	LoCation Services
LDR	Location Deferred Request
LIR	Location Immediate Request,
LMU	Location Measurement Unit
LSAF	Location Subscriber Authorization Function
LSBcF	Location System Broadcast Function
LSBF	Location System Billing Function
LSCF	Location System Control Function
LSOF	Location System Operation Function
LSPF	Location Subscriber Privacy Function
MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Execution Environment
MLC	Mobile Location Center
MM	Mobility Management
MO-LR	Mobile Originated Location Request
MS	Mobile Station
MSC	Mobile Services switching Center
MSC	Mobile services Switching Centre
MSISDN	Mobile Station Integrated Services Data Network
MT-LR	Mobile Terminated Location Request
NA-ESRD	North American Emergency Service Routing Digits
NA-ESRK	North American Emergency Service Routing Key
NI-LR	Network Induced Location Request
OSA	Open Service Architecture
OTDOA	Observed Time Difference Of Arrival
PC	Power Control
PCF	Power Calculation Function
PLMN	Public Land Mobile Network
POI	Privacy Override Indicator
PRCF	Positioning Radio Co-ordination Function
PRRM	Positioning Radio Resource Management
PSE	Personal Service Environment
PSMF	Positioning Signal Measurement Function
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Routing Area
RACH	Random Access Channel
RAN	Radio Access Network
RANAP	Radio Access Network Application Part
RIS	Radio Interface Synchronization
RNC	Radio Network Controller
RRM	Radio Resource Management
RTD	Real Time Difference
SAT	SIM Application Tool-Kit
SCCP	Signalling Connection Control Part
SCS	Service Capability Server
SGSN	Serving GPRS Support Node, SGSN in this specification normally refers to 3G-SGSN only, SGSN in GSM is noted 2G-SGSN
SI	Service Interface (prefix to interface class method)
SIM	Subscriber Identity Module
SIR	Signal Interference Ratio

SLPP	Subscriber LCS Privacy Profile
SMLC	Serving Mobile Location Center
SMS	Short Message Service
SP	Service Point
SRNC	Serving RNC
SS7	Signaling System No 7
TA	Timing Advance
TMSI	Temporary Mobile Subscriber Identity
TOA	Time Of Arrival
UDT	SCCP Unitdata message
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunication System
USIM	Universal Subscriber Identity Module
UTRAN	Universal Terrestrial Radio Access Network
VASP	Value Added Service Provider
VHE	Virtual Home Environment
WCDMA	Wideband Code Division Multiple Access

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

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

4.3.1 Standard LCS Methods in UTRAN

The specification TS 25.305 [1] UTRAN Stage 2 specifies the locating methods to be supported:

- cell coverage based positioning method;
- OTDOA positioning method;
- GPS based positioning methods.

For more details on these positioning methods, refer to TS 25.305 [1].

4.3.2 Standard LCS Methods in GERAN

The specification TS 43.059 [16] GERAN LCS Stage 2 specifi~~c~~es the locating methods to be supported in GERAN:

- cell coverage based positioning method;
- Enhanced Observed Time Difference (E-OTD) positioning method;
- GPS based positioning methods.

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

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), 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 [1]. 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 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. 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.

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

10.3 GMLC

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.

Table10.6: GMLC Permanent Data for a LCS Client

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

NOTE: The LCS Client is identified with E.164 number or APN. APN is specified in TS 23.003 [17].

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

3GPP TSG-SA2 Meeting #42
Sophia Antipolis, France, 11th-15th October 2004

Tdoc ⌘ S2-043238

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.271** **CR** **286** ⌘ **rev** **-** ⌘ Current version: **6.9.0** ⌘

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

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

Title:	⌘	Privacy mechanism at Deferred Location Request – UE available event
Source:	⌘	Ericsson
Work item code:	⌘	LCS2
Date:	⌘	20/9/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	Up to Rel-5 the privacy checks in case of a Deferred Request were done when the request was received in MSC and also when the event was satisfied. The security checks or the privacy checks for a call related request should better be done when the request is received, so that if they fail the error is returned as soon as possible. The H-GMLC already has the information useful for the Deferred request, so there is no need for the MSC to send back to the V-GMLC and to H-GMLC the privacy related action. The text regarding the information returned from MSC towards the V-GMLC when the UE has moved under another MSC was deleted from the TS, although this includes important information to be transferred. Finally, there is an ambiguous example of privacy check failure.
Summary of change:	⌘	The serving node shall perform the security and the privacy check related actions, upon receiving Provide Subscriber location message, as well as when the event occurs. The privacy related action indicators are removed from the Subscriber Location Report to V-GMLC. The information that the UE has moved under another MSC is included in the Subscriber Location Report, when this is applicable.

		Finally, the ambiguous example in step 9 is removed.
Consequences if not approved:	⌘	Misleading description in the Deferred MT-LR, which may lead to wrong implementation.

Clauses affected:	⌘	9.1.8			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

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

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

<< First Modified Clause >>

9.1.8 Mobile Terminating Deferred Location Request – UE available event

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

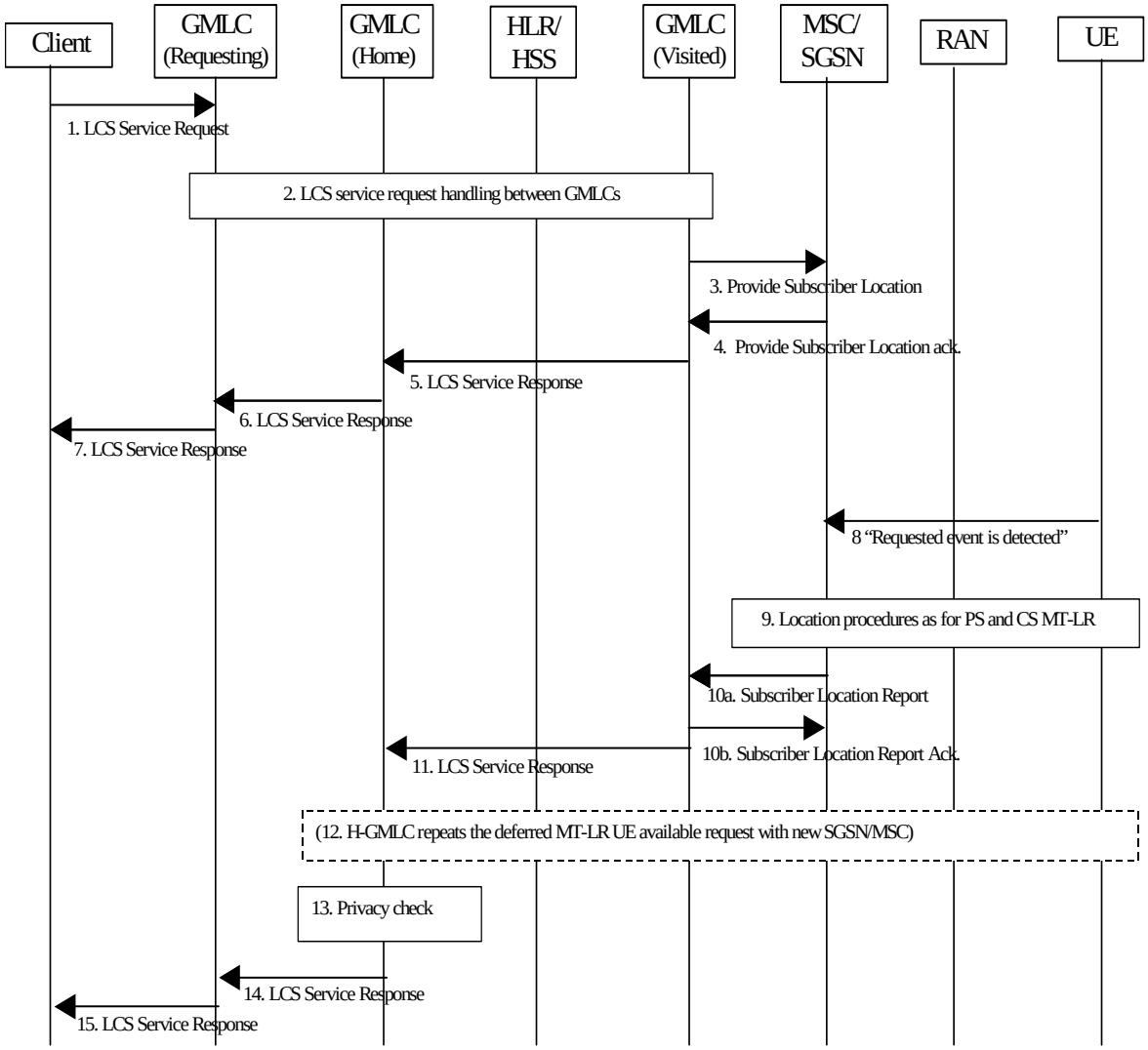

Figure 9.6a: General Network Positioning for a Deferred MT-LR with UE available event

9.1.8.1 Deferred Location Request Procedure

1) The LCS Service Request shall contain an indication of the requested event i.e. UE available. The R-GMLC assigns a LDR reference number to this LCS Service request.

2) LCS service request handling between GMLCs as described in clause 9.1.1. The information received by the R-GMLC is transferred to the V-GMLC via the H-GMLC, including the LDR reference number and the H-GMLC address.

3) The V-GMLC sends the UE available event to MSC/SGSN in the Provide Subscriber Location request (deferred) and includes the LDR reference number and the H-GMLC address in the request.

Note: It shall be possible to issue the deferred location requests for the UE available event, even in case there is an ongoing previous MT-LR for the same UE.

4) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), or if either the security or privacy check related actions fail, then a Provide Subscriber Location return error shall be returned with a suitable cause. If the SGSN/MSC can support the deferred location request for the specified event, a Provide Subscriber Location ack. shall be returned to the V-GMLC without a location estimate. The SGSN/MSC may record charging information for an accepted deferred location request.

5) V-GMLC returns the LCS Service Response to H-GMLC to notify whether the request was successfully accepted or not. The V-GMLC may record charging information for an accepted deferred location request.

6) H-GMLC returns the LCS Service Response to R-GMLC to notify whether the request was successfully accepted or not. The H-GMLC may record charging information for an accepted deferred location request.

7) The R-GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not. When the R-GMLC returns the LCS Service Response to the LCS Client, the LDR reference number assigned by the R-GMLC shall be included. The R-GMLC may record charging information for an accepted deferred location request.

9.1.8.2 Location Report Procedure

8) Immediately following step 3, the SGSN/MSC shall verify if the requested event is already satisfied (e.g. UE available inferred from a current transaction) or can be invoked immediately (e.g. by paging the UE and receiving a page response). If the requested event is not already satisfied, the SGSN/MSC waits until it has occurred or until some maximum time has expired.

   In case the SGSN/MSC receives an indication that the UE has moved to another SGSN/MSC, while it is waiting for the requested event to happen, SGSN/MSC shall immediately send a Subscriber Location Report to the V-GMLC, which forwards it to the H-GMLC. The report shall include the ~~privacy related action,~~ reference number and H-GMLC address that were included in the Provide Subscriber Location request and the information that the MT-LR must be reinitiated against the new SGSN/MSC. It shall also include the address of the new SGSN/MSC, if available. (H-GMLC shall in this case reinitiate the MT-LR with the new SGSN/MSC, see step 12.)

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

   If either security or privacy check related actions fail, ~~e.g. because the location information is not session or call related,~~ the SGSN/MSC shall send a Subscriber Location Report with the reference number and H-GMLC address that was included in the Provide Subscriber Location with appropriate error cause indicating termination of the deferred location request.

10) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall include the reference number that was included in the Provide Subscriber Location, the H-GMLC address and an indication that this is a response to a previously sent deferred location request. The SGSN/MSC may record charging information.

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

11) V-GMLC sends the LCS Service Response to the H-GMLC with an indication of the event occurrence and the LDR reference number.

12) In case the LCS Service Response indicates to H-GMLC that the mobile has moved to another SGSN/MSC, the H-GMLC shall send the deferred MT-LR with UE available event to the V-GMLC (previous or new), which forwards the request to the new SGSN/MSC, as described in step 2 onwards.

13) The H-GMLC performs the privacy check as described in clause 9.1.1.

14) The H-GMLC sends the LCS Service Response to R-GMLC.

15) The R-GMLC sends the LCS Service Response to the LCS Client. When the R-GMLC returns the LCS Service Response to the LCS Client, the LDR reference number that was sent to the LCS Client in step 3 shall be included.

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CHANGE REQUEST

⌘ **23.271** **CR** **282** ⌘ **rev** **1** ⌘ Current version: **5.12.0** ⌘

*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:	⌘	Resolving Invalid Referencing
Source:	⌘	Vodafone (Rapporteur)
Work item code:	⌘	LCS2
Date:	⌘	28/09/2004
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:	⌘	At the request of MCC to remove invalid references.
Summary of change:	⌘	Remove invalid references to specifications in previous releases. Add reference numbers where missing And a number of editorial changes where the section is modified already.
Consequences if not approved:	⌘	Incorrect Referencing

Clauses affected:	⌘	2.1, 3.1, 3.3, 4.3.1, 4.3.2, 5.4.4, 5.5.2, 9.1.2.1, 9.1.6.2, 10.1.1, 10.3.1

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

Other comments: ⌘

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

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

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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.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

2.1 Normative references

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

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

[3] 3GPP TS 21.905: "~~UMTS Abbreviations and acronyms~~Vocabulary for 3GPP Specifications".

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

[5] (void)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[32a] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service Description, Stage 1"

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

3.1 Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

LDR reference number: Unique identity of a Location Deferred Request, which is assigned and maintained by the GMLC and circulated between the LCS Client, GMLC and MSC/SGSN. In addition, in a Periodical Immediate/deferred LCS Service Request, the LDR reference number is exclusive.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Target UE: UE being positioned

User Equipment: term 'User Equipment', or 'UE'~~, should for GSM be interpreted as 'MS',~~ as defined in ~~GSM~~3GPP TS ~~04.02~~21.905 [~~19~~3]. UE in this specification may also refer to a Mobile Equipment or User Equipment used for emergency calls, that do not have valid SIM or USIM

Further UMTS related definitions are given in 3GPP TS 22.101 [8].

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

3.3 Abbreviations

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

2G-	Second Generation
3G-	Third Generation
AC	Admission Control
AI	Application Interface (prefix to interface class method)
ANM	Answer Message (ISUP)
APN	Access Point Name
APN-NI	APN Network Identifier
ARIB	Association of Radio Industries and Business
ATD	Absolute Time Difference
BCCH	Broadcast Control Channel
BER	Bit Error Rate
BSS	Base Station Subsystem
BTS	Base Transceiver Station
CAMEL	Customised Application For Mobile Network Enhanced Logic
CAP	CAMEL Application Part
CM	Connection Management

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

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

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

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

4.3.1 Standard LCS Methods in UTRAN

The specification TS 25.305 [1] UTRAN Stage 2 specifies the locating methods to be supported:

- cell coverage based positioning method;
- OTDOA positioning method;
- GPS based positioning methods.

For more details on these positioning methods, refer to TS 25.305 [1].

4.3.2 Standard LCS Methods in GERAN

The specification TS 43.059 [16] GERAN LCS Stage 2 specifi~~ci~~es the locating methods to be supported in GERAN:

- cell coverage based positioning method;
- Enhanced Observed Time Difference (E-OTD) positioning method;

- GPS based positioning methods.

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

5.4.4 Positioning components

The positioning components Positioning Radio Co-ordination Function (PRCF), Positioning Calculation Function (PCF), Positioning Signal Measurement Function (PSMF) and Positioning Radio Resource Management (PRRM) are described in documents specific to each Access Network type.

For location services the Access Network shall send the result of the positioning to the core network in geographical co-ordinates as defined in TS 23.032 [11]. The Access Network shall map the cell(s) the Target UE is associated with into geographical co-ordinates, but this mapping is not standardized.

These entities are defined in TS 25.305 [1] for UTRAN and in TS 43.059 [16] for GERAN.

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

5.5.2 Location Service Response

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

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

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

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 [11] or local coordinate system;
- The information about the positioning method used to obtain the location estimate of the UE, if it is available at the LCS server and if needed;
- Indication when UE enters or leaves the Geographical area, if needed;
- Acknowledgement for a deferred location request, if needed.
- LDR reference number, if needed.

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

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

9.1.2.1 Location Preparation Procedure

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

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

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

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

Note: In some network mode of operation, a GPRS capable UE may not receive the CS paging. In addition, upon receipt of a CS paging, a GPRS capable UE may immediately answer to the Paging Request or delay the answer, as defined in 3GPP TS 22.060 [32a] and 23.060 [15]. A GPRS UE in class B mode may also suspend its GPRS traffic, sending a GPRS Suspension Request to the network.

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

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

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

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

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

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

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

9.1.6.2 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 [1] and in GERAN Stage 2 TS 43.059 [16]. 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.

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

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

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

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

Table 10.1: Logical States for each LCS Privacy Class

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

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

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

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

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

Service type indication	Status	Additional HLR data when the indication is stored
Service Types	O	Service types list: a list of one or more service types for which the LCS client is allowed to locate the particular UE. The possible service types are defined in 22.071 [4]. The following data may be present for each service type in the list:
	O	• Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country
	C	• Indication of one of the following mutually exclusive options: - Location allowed without notification (default case) - Location allowed with notification - Location with notification and privacy verification; location allowed if no response - Location with notification and privacy verification; location restricted if no response

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

Table 10.4: Logical States for each Mobile Originating LCS Class

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

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

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

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

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

Table 10.6a: Temporary LCS data in the HLR

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

******** LAST MODIFIED 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 associated with LCS client's external identity (i.e., E.164 address). See note 2.
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 1: The LCS Client is identified with E.164 number or APN-NI. APN-NI is specified in TS 23.003 [17].

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

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Sophia Antipolis, France, 11 – 15 October 2004

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CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **283** ⌘**rev** **1** ⌘ Current version: **6.9.0** ⌘

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

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

Title:	⌘	Resolving Invalid References
Source:	⌘	Vodafone (Rapporteur)
Work item code:	⌘	LCS2
Date:	⌘	12/10/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	At the request of MCC to remove invalid references.
Summary of change:	⌘	Remove invalid references to specifications in previous releases. Add reference numbers where missing And a number of editorial changes where the section is modified already.
Consequences if not approved:	⌘	Incorrect Referencing

Clauses affected:	⌘	2.1, 3.1, 3.3, 4.3.1, 4.3.2, 5.4.1.3, 5.4.2.5, 5.4.4, 5.5.1, 5.5.2, 5.6.1, 5.6.2, 9.1.2.1, 9.1.6.2, 9.1.9, 10.1.1, 10.3.1, 10.3.2

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

Other comments:	⌘	

How to create CRs using this form:
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.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

2.1 Normative references

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

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

[3] 3GPP TS 21.905: "~~UMTS Abbreviations and acronyms~~Vocabulary for 3GPP Specifications".

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

[5] (void)

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

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

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

[9] ~~3GPP TS 22.105: "Services and Service Capabilities".~~(void)

[10] ~~3GPP TS 22.115: "Charging and Billing".~~(void)

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

[12] ~~3GPP TS 22.121: "The Virtual Home Environment".~~(void)

[13] ~~3GPP TS 23.110: "UMTS Access Stratum Services and Functions".~~(void)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[31] OMA Location Working Group "Mobile Location Protocol Specification", [http://www.openmobilealliance.org]

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

[33] RFC 2396: ""Uniform Resource Identifiers".".

[34] RFC 3261: ""SIP: Session Initiation Protocol"".

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

[35a] ITU Recommendation E.164: ""The international public telecommunication numbering plan".".

[35b] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service Description, Stage 1".

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

3.1 Definitions

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

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

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

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

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

Deferred location request: location request where the location response (responses) is (are) required after a specific event has occurred. The event may or may not occur immediately

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

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

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

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

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

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

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

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

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

LCS QoS Class: The QoS class determines the degree of adherence to the quality of service information as required by the source of a location request

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

LDR reference number: Unique identity of a Location Deferred Request, which is assigned and maintained by the R-GMLC and circulated between the LCS Client, R-GMLC, H-GMLC, V-GMLC, MSC/SGSN and UE. Notes: UE is involved only when the event type of the deferred request is “change of area”. In addition, in a Periodical Immediate/deferred LCS Service Request, the LDR reference number is exclusive.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Pseudonym mediation device: functionality that verifies pseudonyms to verinyms

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

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

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

Response method: method how a GMLC, which receives a location request message from another entity (i.e. LCS client or GMLC), responds to the location request. There are two methods, synchronous (SYNC) and asynchronous (ASYNC). When the requesting entity wishes multiple responses (either about one or several target UE's location) to a single location request the procedure is ASYNC and when the requesting entity wishes a single response the procedure

is SYNC. The source entity of the location request (i.e. LCS client or GMLC) can choose a preferred method and informs the method to the receiving GMLC. However, the selection of the method used is made by the receiving GMLC and when the ASYNC method is selected the Request id is notified to the source entity. The receiving GMLC can turn a SYNC request into an ASYNC procedure, e.g. in an overload situation, and the source entity (i.e. LCS client or GMLC) should be able to receive multiple responses even though the request was SYNC.

Service Area Identifier (SAI): information, which is used to identify an area consisting of one or more cells belonging to the same Location Area, see ref. [14]. Such an area is called a Service Area and can be used for indicating the location of a UE to the CN. For this specification, only a Service Area that is defined to be applicable to the PS and CS domains shall be used.

Service coverage: a list of country codes where an LCS client offers its location services. Country code in this context means E.164 country code for a geographic area [35a].

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

Serving cell identity: the Cell Global Identification (CGI), see ref [17], of the cell currently used by the target UE, e.g. for an emergency call in A-mode.

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

Target area: geographical area which is used for change of area type deferred location request. The target area is defined by the LCS client and is expressed as geographical area using a shape defined in TS 23.032 [11], as a geographical area using local coordinate system, as an E.164 country code for a geographic area [35a], as a PLMN identity or as a geopolitical name of the area (e.g. London).

Target UE: UE being positioned

User Equipment: term 'User Equipment', or 'UE', ~~should for GSM be interpreted as 'MS',~~ as defined in ~~GSM~~ TS 21.905~~04.02~~ [~~19~~3]. UE in this specification may also refer to a Mobile Equipment or User Equipment used for emergency calls, that do not have valid SIM or USIM

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

Further UMTS related definitions are given in 3GPP TS 22.101 [8].

3.3 Abbreviations

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

2G-	Second Generation
3G-	Third Generation
AC	Admission Control
AI	Application Interface (prefix to interface class method)
ANM	Answer Message (ISUP)
APN	Access Point Name
APN-NI	APN Network Identifier
ARIB	Association of Radio Industries and Business
ATD	Absolute Time Difference
BCCH	Broadcast Control Channel
BER	Bit Error Rate
BSS	Base Station Subsystem
BTS	Base Transceiver Station
CAMEL	Customised Application For Mobile Network Enhanced Logic
CAP	CAMEL Application Part
CM	Connection Management
CN	Core Network
CSE	Camel Service Environment
DL	Downlink
DNS	Domain Name System
DRNC	Drift RNC
E-OTD	Enhanced Observed Time Difference
FER	Frame Error Rate

GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMLC	Gateway MLC
GPRS	General Packet Radio Service
GPS	Global Positioning System
HE	Home Environment
H-GMLC	Home-GMLC
H-LIMS-IWF	Home-LIMS-IWF
HSS	Home Subscriber Server
HLR	Home Location Register
HPLMN	Home Public Land Mobile Network
IMEI	International Mobile Equipment Identity
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IPDL	Idle Period Downlink
LA	Location Application
LAF	Location Application Function
LBS	Location Based Services
LCAF	Location Client Authorization Function
LCCF	Location Client Control Function
LCCTF	Location Client Co-ordinate Transformation Function
LCF	Location Client Function
LCZTF	Location Client Zone Transformation Function
LCS	LoCation Services
LDR	Location Deferred Request
LIMS-IWF	Location IMS – Interworking Function
LIR	Location Immediate Request,
LMU	Location Measurement Unit
LSAF	Location Subscriber Authorization Function
LSBcF	Location System Broadcast Function
LSBF	Location System Billing Function
LSCF	Location System Control Function
LSCTF	Location System Co-ordinate Transformation Function
LSOF	Location System Operation Function
LSPF	Location Subscriber Privacy Function
LSTF	Location Subscriber Translation Function
MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Execution Environment
MLC	Mobile Location Center
MLP	Mobile Location Protocol
MM	Mobility Management
MO-LR	Mobile Originated Location Request
MS	Mobile Station
MSC	Mobile services Switching Centre
MSISDN	Mobile Station Integrated Services Data Network
MT-LR	Mobile Terminated Location Request
NA-ESRD	North American Emergency Service Routing Digits
NA-ESRK	North American Emergency Service Routing Key
NI-LR	Network Induced Location Request
OMA	Open Mobile Alliance
OSA	Open Service Architecture
OTDOA	Observed Time Difference Of Arrival
PC	Power Control
PCF	Power Calculation Function
PLMN	Public Land Mobile Network
PMD	Pseudonym mediation device functionality
POI	Privacy Override Indicator
PPR	Privacy Profile Register
PRCF	Positioning Radio Co-ordination Function
PRRM	Positioning Radio Resource Management

PSE	Personal Service Environment
PSMF	Positioning Signal Measurement Function
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Routing Area
RACH	Random Access Channel
RAN	Radio Access Network
RANAP	Radio Access Network Application Part
R-GMLC	Requesting-GMLC
RIS	Radio Interface Synchronization
R-LIMS-IWF	Requesting-LIMS-IWF
RNC	Radio Network Controller
RRM	Radio Resource Management
RTD	Real Time Difference
SAI	Service Area Identifier
SAT	SIM Application Tool-Kit
SCCP	Signalling Connection Control Part
SCS	Service Capability Server
SGSN	Serving GPRS Support Node
SI	Service Interface (prefix to interface class method)
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SIP-URI	SIP Uniform Resource Identifier
SIR	Signal Interference Ratio
SLF	Subscription Locator Function
SLPP	Subscriber LCS Privacy Profile
SMLC	Serving Mobile Location Center
SMS	Short Message Service
SP	Service Point
SRNC	Serving RNC
SS7	Signaling System No 7
TA	Timing Advance
TEL-URL	Telephone Uniform Resource Locator
TMSI	Temporary Mobile Subscriber Identity
TOA	Time Of Arrival
UDT	SCCP Unitdata message
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunication System
USIM	Universal Subscriber Identity Module
U-TDOA	Uplink Time Difference of Arrival
UTRAN	Universal Terrestrial Radio Access Network
VASP	Value Added Service Provider
V-GMLC	Visited -GMLC
VHE	Virtual Home Environment
WCDMA	Wideband Code Division Multiple Access

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

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

4.3.1 Standard LCS Methods in UTRAN

The specification TS 25.305 [1] UTRAN Stage 2 specifies the locating methods to be supported:

- cell coverage based positioning method;
- OTDOA positioning method;
- GPS based positioning methods.

For more details on these positioning methods, refer to TS 25.305 [1].

4.3.2 Standard LCS Methods in GERAN

The specification TS 43.059 [16] GERAN LCS Stage 2 specifies the locating methods to be supported in GERAN:

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

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

5.4.1.3 Location Client Co-ordinate Transformation Function (LCCTF)

The Location Client Co-ordinate Transformation Function (LCCTF) provides conversion of a location estimate expressed according to a universal latitude and longitude system into an estimate expressed according to a local geographic system understood by the LCF and known as location information. The local system required for a particular LCF will be either known from subscription information or explicitly indicated by the LCF. The LCCTF also provides the conversion of a target area to either a shape as defined in TS 23.032 [11], a PLMN, or country code. This is performed only if target area information is received from the LCS Client.

5.4.2.5 Location System Co-ordinate Transformation Function (LSCTF)

The Location System Co-ordinate Transformation Function (LSCTF) provides the conversion of an area definition, expressed in a geographic shape as defined in TS 23.032 [11], to network identities recognised only within a PLMN (such as Cell Identity, Location Area Identity). The area definition may convert to more than one network identity such as a collection of Cell Global Identities.

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

5.4.4 Positioning components

The positioning components Positioning Radio Co-ordination Function (PRCF), Positioning Calculation Function (PCF), Positioning Signal Measurement Function (PSMF) and Positioning Radio Resource Management (PRRM) are described in documents specific to each Access Network type.

For location services the Access Network shall send the result of the positioning to the core network in geographical co-ordinates as defined in TS 23.032 [11]. The Access Network shall map the cell(s) the Target UE is associated with into geographical co-ordinates, but this mapping is not standardized.

These entities are defined in TS 25.305 [1] for UTRAN and in TS 43.059 [16] for GERAN.

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

5.5.1 Location Service Request

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

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

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

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

- Target UE identity (either verinym or pseudonym);
- LCS Client identity;
- Service identity, if needed;
- Response method (SYNC or ASYNC), if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Type of Event definition, i.e. UE available or change of area, applicable to deferred location requests only;
- Definitions for change of area type deferred location requests. Following parameters may be defined, if needed;
    a) Indication for event trigger, i.e. UE enters, leaves or is within requested target area;
    b) Indication of either a single event report or multiple event reports;
    c) Minimum interval time between area event reports, if multiple event reports is requested;
    d) Indication of the requested location estimate; i.e. whether the location estimate of the target UE should be contained in the change of area event report;
- Start time, stop time (i.e. specifying the validity time of LCS request), if needed;
- Interval, applicable to periodical requests only;
- Requested Quality of Service information, if needed, i.e. accuracy, response time and LCS QoS Class;
- Requested type of location, i.e. current location or last known location applicable to LIR only (current location is only available for LDR);
- Priority, if needed;
- Service coverage (i.e. E.164 country codes for geographic areas [35a]), if needed;
- Requested maximum age of location, if needed;
- Local coordinate reference system, if needed;
- Target area, i.e. geographical area expressed as one of the following format, if needed.
    a) a shape defined in TS 23.032 [11]
    b) local coordinate system
    c) E.164 country code for a geographic area [35a]
    d) PLMN identity
    e) geopolitical name of the area (e.g. London)

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

5.5.2 Location Service Response

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

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

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

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 [11] or local coordinate system;
- The information about the positioning method used to obtain the location estimate of the UE, if it is available at the LCS server and if needed;
- Time stamp of location estimate;
- Indication when UE enters, is within or leaves the Geographical area, if needed;
- Acknowledgement for a deferred location request, if needed.
- Request id, if needed.
- LDR reference number, if needed.
- Indication that the requested QoS was not met, if needed, only applicable if the request was for best effort class

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

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

5.6.1 Location Service Request

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

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

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

- Target UE identity, (either one or both of MSISDN and IMSI, or SIP-URI, or pseudonym);
- LCS Client identity, i.e. LCS client external identity or internal identity;
- LCS Client type, (i.e. Value added, Emergency, PLMN operator or Lawful interception);
- LCS Client name, if needed (and type of LCS client name if available);
- Service type, if needed;
- Response method (SYNC or ASYNC), if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Type of Event definition, i.e. UE available or change of area, applicable to deferred location requests only;
- Definitions for change of area type deferred location requests. Following parameters may be defined, if needed;
  a) Indication for event trigger, i.e. UE enters, leaves or is within requested target area;
  b) Indication of either a single event report or multiple event reports;
  c) Minimum interval time between area event reports;
  d) Start time, stop time, i.e. specifying the validity time of LCS area event request
- Requested Quality of Service information, if needed, i.e. accuracy, response time and LCS QoS Class;

- Requested type of location, i.e. “current location”, “current or last known location” or “initial location” applicable to LIR only (current location is only available for LDR);
- Priority, if needed;
- Requested maximum age of location, if needed;
- Privacy override indicator, if needed;
- Service coverage (i.e. E.164 country codes for geographic areas [35a]), if needed;
- Indicator of privacy check related actions, if needed;
- Supported GAD shapes, if needed;
- HPLMN LCS server address, i.e. H-GMLC address, if needed;
- VPLMN LCS server address, i.e. V-GMLC address, if needed;
- Network address of Privacy Profile Register, if needed;
- Network numbers of serving nodes;
- LCS capability sets of serving nodes, if needed.
- Target area, i.e. geographical area expressed as one of the following format, if needed.
  a) a shape defined in TS 23.032 [11]
  b) E.164 country code for a geographic area [35a]
  c) PLMN identity
- LDR reference number, if needed.

5.6.2 Location Service Response

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

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

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

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 [11];
- Indication when UE enters, is within or leaves the geographical area, if needed;
- The information about the positioning method used to obtain the location estimate of the UE, if it is available at the LCS server and needed;
- Age of location estimate;
- Acknowledgement for a deferred location request, if needed.
- Request id, if needed
- Indication that the requested QoS was not met, if needed, only applicable if the request was for best effort QoS class

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

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

9.1.2.1 Location Preparation Procedure

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

2) The GMLC sends a PROVIDE_ SUBSCRIBER _LOCATION message to the MSC/MSC server indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a call related location request, the message also carries the LCS client's called party number. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client (or the pseudo external identity) and the Requestor Identity (if that is both supported and available). Also the message may carry the type of the LCS client name and also the type of the Requestor identity if the requestor identity was included. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. Moreover the message may also carry the Service Type**.** If the result of the privacy check at H-GMLC/PPR indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. MSC and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. When the Requestor identity is added to the LCS client name the practise described in the Annex D should be followed. The message also shall carry the indicators of privacy related action which is described in chapter 9.5.4 , if it 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 contains the indicators of privacy related action, the VMSC/MSC server determines a required privacy related action as described in Annex A.3. If the PSL message from the GMLC does not include the indicators of privacy related action, the VMSC/MSC server then verifies LCS barring restrictions in the UE user's subscription profile in the MSC server. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC.
Otherwise, if the UE is in idle mode, the Core Network performs paging, authentication and ciphering. The MSC will page a GPRS attached UE either through A/Iu or Gs interface, depending on the presence of the Gs interface (see Note 2). The UE will inform the network about its LCS capabilities, as described in chapter 6.3.4. If the UE is instead in dedicated mode, the VMSC/MSC server will already have UE classmark information. In GSM this is supported by controlled early classmark sending.

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

Note 2: In some network mode of operation, a GPRS capable UE may not receive the CS paging. In addition, upon receipt of a CS paging, a GPRS capable UE may immediately answer to the Paging Request or delay the answer, as defined in 3GPP TS 22.060 [35b] and 23.060 [15]. A GPRS UE in class B mode may also suspend its GPRS traffic, sending a GPRS Suspension Request to the network.

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

NOTE 3: It is for further study, if all available client identities are to be included in the Privacy Notification message to be shown to the end-user.

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

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

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

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 [1] and in GERAN Stage 2 TS 43.059 [16]. 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.

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

9.1.9 Deferred Location Request Procedure for the change of area event

Figure 9-6d illustrates the procedures for a Deferred Location Request where the Location Report is returned to the network by the UE following a change of area event. An area event occurs when the UE leaves, enters or is within a target area as defined by geographical area, PLMN identity, country code or geopolitical name of the area. Details of the target area are contained in the LCS Service Request message, see clause 5.5.1.

The PLMN operator may choose to use another mechanism (such as SIM Application Toolkit) for the transfer and detection mechanism of the Area Definition and change of area event information to the UE. In this case, the GMLCs handle steps 2 to 7 and 11 to 14 differently from that shown below. An alternative mechanism is detailed in Annex F

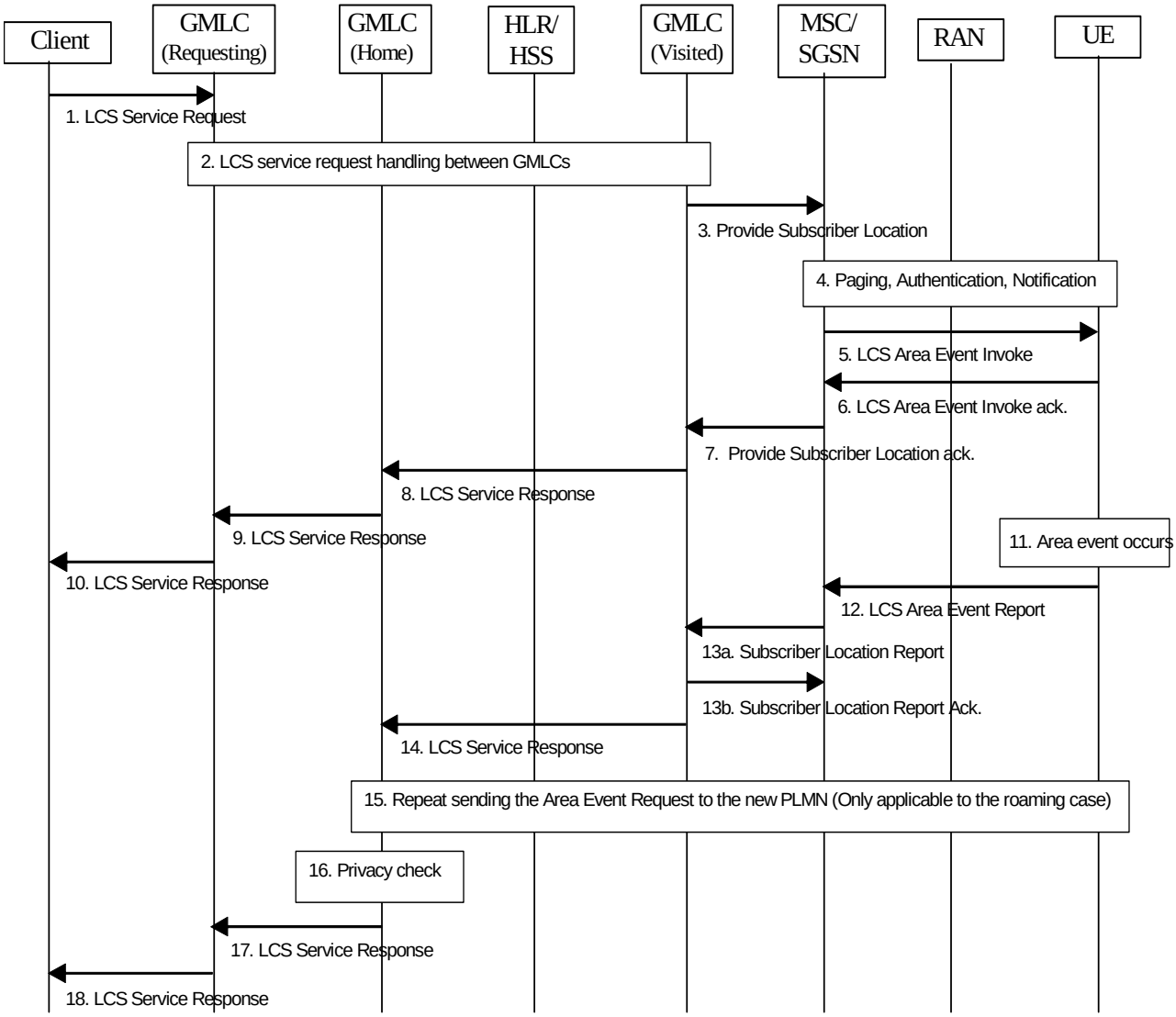

Figure 9.6d: Deferred MT-LR procedure for the Area event

1) The LCS Service Request contains the change of area type deferred location request information, i.e. details of the target area and the nature of the event, whether the event to be reported is the UE being inside, entering into or leaving the target area. The LCS service request may specify the validity time, i.e. start time and stop time, for the deferred location request and R-GMLC may cancel the deferred location request as described in clause 9.1.9.1. In addition, when validity time of a pending area event request in the target UE expires, the UE shall delete the pending deferred location request. The LCS Service Request shall contain an indication of the minimum interval time between area event reports, if applicable. The LCS service request shall contain the information whether the deferred area event may be reported one time only, or several times. If the change of area event is reported one time only, the Location Service request shall be completed after the first area event has occurred. The R-GMLC assigns a LDR reference number to this LCS Service request. If the target area is expressed by local coordinate system or geopolitical name, the R-GMLC shall convert the target area to geographical area expressed by a shape defined in TS 23.032 [11]. In addition to the target area definition, the LCS Client may include the country code of the target area in the area event request.

2) LCS service request handling between GMLCs as described in clause 9.1.1. If indication of the requested location estimate is included in the area event request, the R-GMLC should record this indication and any relevant parameters such as QoS. The information received by the R-GMLC is transferred to the V-GMLC via the H-GMLC, including the LDR reference number and the H-GMLC address.

   If the H-GMLC notices that the current visited PLMN does not serve the target area, it may generate a modified deferred LCS service request in order to get notified when the target UE enters a PLMN that serves the target area. The modified target area event is that the target UE enters one of the PLMNs that serve the original target area. Note that the new area event may include multiple PLMNs (identified by PLMN IDs) if there are more

than one PLMN that serves the original target area, based on the stored PLMN list and the corresponding estimated coverage. The H-GMLC then generates a new location request with the new defined area event and the same rest of the information in the original request.

The new location request is sent to the target UE via the current V-GMLC. The H-GMLC keeps the original area event location service request pending for as long as determined by the validity time of the request. When the UE enters one of the pre-defined PLMNs, it sends an area event location report to H-GMLC. The H-GMLC then sends the original area event location service request to the UE via the new V-GMLC. If the H-GMLC cannot derive a list of PLMNs that may cover the target area, and the current visited network does not cover the target area, the H-GMLC may reject the request.

3) If the received target area is expressed by a shape defined in TS 23.032 [11], V-GMLC converts the target area into an Area Definition consisting of the corresponding list of cell identities, location areas or routing area. If the V-GMLC is not able to translate the target area into network identities, it shall reject the request and send an LCS service response to H-GMLC with the appropriate error cause.
If the received target area is expressed by country code or PLMN identity, the V-GMLC shall use the country code or PLMN identity as the Area Definition.
The V-GMLC sends the Area Definition to MSC/SGSN in the Provide Subscriber Location request (deferred) and includes the LDR reference number and the H-GMLC address in the request.
The message shall define whether the event to be reported is the UE being inside, entering into or leaving the area. The message shall also include the validity period of the location request, the minimum interval time between area event reports, the information whether the deferred area event may be reported one time only or several times, if applicable.

4) The MSC/SGSN verifies the UE capabilities with regard to the change of area event. If either the MSC/ SGSN or the UE does not support the deferred location request for the change of area event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned with a suitable cause in step 7. If the UE is in idle mode, the core network performs paging, authentication and ciphering. If privacy notification/verification is requested, the MSC/SGSN sends an LCS Location Notification Invoke message to the target UE indicating the change of area type deferred location request and whether privacy verification is required. LCS Location Notification is further specified in clauses 9.1.2 and 9.1.6. If privacy verification was requested, the UE returns an LCS Location Notification Return Result to the MSC/SGSN indicating whether permission is granted or denied.

5) The MSC/SGSN sends the LCS Area Event Invoke to the UE carrying the Area Definition, other area event information, the LDR reference number and the H-GMLC address. The message shall also define whether the event to be reported is the UE being inside, entering into, leaving the area. The message shall also include the validity period of the location request, the minimum interval time between area event reports and the information whether the deferred area event may be reported one time only, or several times, if applicable.

6) If the LCS Area Event Invoke is successfully received by the UE and the UE supports the change of area type deferred location request, the UE sends acknowledgement to MSC/SGSN and begins monitoring for the change of area event. The UE shall determine whether it is inside, entering into or leaving the target area by comparing the current serving cell identity, location area, routing area, PLMN identity or country code to the Area Definition received from the MSC/SGSN. In case of soft handover, it is sufficient if one of the cells belongs to the target area. In case the Area Definition consists of a location or routing area, PLMN or country identity the UE shall check for the area event during the normal location or routing area update procedure. The change of area event detection mechanism must not influence on the normal UE cell selection and reselection procedures. If the UE does not support the deferred location request (for temporary or permanent reasons), it shall send the LCS Area Event Invoke ack. with the appropriate error cause.

7) If either the MSC/ SGSN or the UE does not support the deferred location request for the change of area event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned to the V-GMLC with a suitable cause. If both of the SGSN/MSC and UE supports the deferred location request for the change of area event, a Provide Subscriber Location ack. shall be returned to the V-GMLC without a location estimate. MSC/SGSN shall include the result of the notification/verification in the response to the V-GMLC, if the notification/verification is needed. The response message shall include the LDR reference number and the H-GMLC address. The change of area event invoke result shall be also included, if necessary. After sending the Provide Subscriber Location ack to the V-GMLC, the deferred location request shall be completed in the MSC/SGSN. The SGSN/MSC may record charging information for an accepted area event request.

8) to 10) V-GMLC returns the LCS Service Response via H-GMLC and R-GMLC to the LCS Client to notify whether the request was successfully accepted or not. When the R-GMLC returns the LCS Service Response to

the LCS Client, the LDR reference number assigned by the R-GMLC shall be included. After sending the LCS Service Response to the H-GMLC, the deferred location request shall be completed in the V-GMLC. The V-GMLC or R-GMLC may record charging information for an accepted area event request.

11) UE detects that the requested area event has occurred.

12) Before sending the LCS Area Event Report the UE shall establish either a CS radio connection or PS signalling connection as specified in clauses 9.2.1 and 9.2.2. The UE sends the LCS Area Event Report to the VMSC/SGSN including the original LDR reference number and the H-GMLC address. The report shall also include the result of the notification/verification procedure, if the notification/verification is needed.

When the MSC/SGSN receives the report and it can handle this report, an acknowledgement as a response should be sent to the UE. If the UE does not receive any response from the MSC/SGSN after sending the report, i.e. the current MSC/SGSN does not support the deferred location request for the area event (for temporary or permanent reasons), the UE may re-send the report more times. If the UE always does not receive the response, the UE shall stop sending the report, then record a corresponding flag to indicate that a report has been sent unsuccessfully. When the UE performs location update and detects the LAI or RA is changed, if the flag has been set, the UE shall send the report to the corresponding MSC/SGSN, and the flag will be cleared upon a success of the sending.
If the UE was requested to report the change of area event one time only, the deferred location request shall be completed. In case multiple reports were requested, the UE must not send a repeated LCS Area Event Report more often than the requested minimum interval indicated in the LCS Area Event Invoke.

Editor's Note: It could be useful to have MSC/SGSN repeat the notification procedure with the target UE after the UE has reported the change of area event, but this is for further study.

13) The MSC/SGSN sends the subscriber location report to its associated V-GMLC with an indication of the event occurrence, the LDR reference number and the H-GMLC address. V-GMLC sends an acknowledgement to MSC/SGSN in step 13b and the MSC/SGSN may record charging information.

14) The V-GMLC sends the LCS Service Response to the H-GMLC with an indication of the event occurrence, the LDR reference number and the H-GMLC address. The LDR reference number and the H-GMLC address will be used to identify the source of the original deferred location request in the case that the UE has relocated before the area event occurred. The V-GMLC may record charging information.

15) In case the UE moves to another PLMN of the PLMN identities list, according to the PLMN identity the UE shall determine whether the Area Definition of the target area is available. If it is not available, the UE shall report that it has roamed into a new PLMN, including the new PLMN identity and the LDR reference number. The H-GMLC shall transfer the original area event request to the V-GMLC of the new PLMN. The procedure should be continued as described in step 2 and onwards where the Area Definition of the new PLMN shall be downloaded to the UE. Otherwise, the UE monitors the area event in the new PLMN, does not inform the H-GMLC that it has entered into a new PLMN.

16) The H-GMLC performs the privacy check as described in clause 9.1.1.

17) The H-GMLC sends the LCS Service Response to R-GMLC. Unless multiple reports were requested, the deferred location request shall be completed in the H-GMLC after sending the LCS Service Response to the R-GMLC. The H-GMLC may record charging information.

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

The R-GMLC sends the LCS Service Response to the LCS client, the LDR reference number that was sent to the LCS Client in step 10 shall be included in the response. If the location estimate of the target UE is requested in the request and the location estimate was successfully obtained, the R-GMLC shall put the obtained location estimate into the LCS Service Response. If the location estimate of the target UE is requested in the request but the location estimate could not be obtained, the R-GMLC sends the LCS Service Response without the location estimate. Unless multiple reports were requested, the deferred location request shall be completed in the R-GMLC after sending the LCS Service Response to the LCS client. The R-GMLC may record charging information.

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

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

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

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

Table 10.1: Logical States for each LCS Privacy Class

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

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

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

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

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

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

Service type indication	Status	Additional HLR data when the indication is stored
Service Types	O	Service types list: a list of one or more service types for which the LCS client is allowed to locate the particular UE. The possible service types are defined in 22.071 [4]. The following data may be present for each service type in the list:
	O	- Restriction on the GMLC. If no value is stored for this data, there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. Possible values are:
	C	- 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, pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.2. The pseudo-external identity is not the identity of real external LCS client but the identity which is used for notifying SGSN/MSC of the location request class (call/session related or non-call/session related) and the required type of indication for each class. Operator allocates E.164 addresses for the pseudo-external identities.

Fourteen pseudo-external identities are needed to 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.

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

Table 10.4: Logical States for each Mobile Originating LCS Class

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

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

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

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

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

Table 10.6a: Temporary LCS data in the HLR

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

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

10.3 GMLC

10.3.1 LCS Data in the GMLC for a LCS Client

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

Table10.7: GMLC Permanent Data for a LCS Client

LCS Client data in GMLC	Status	Description
LCS Client Type	M	Identifies the type LCS client from among the following: - Emergency Services - Value Added Services - PLMN Operator Services - Lawful Intercept Services
External identity	O	A list of one or more identifiers used to identify an external LCS client. The identity may be used when making an MT-LR and/or MO-LR. The format of the identity is an international E.164 address [35a]. 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 [35a], which are used to make calls by mobile subscribers, or APN-NIs (see NOTE) to identify the client for a call related MT-LR In case the LCS client was reached via IN or abbreviated number routing (e.g. toll free number or emergency call routing), the E.164 number(s) stored in the GMLC shall be the number(s) that the UE has to dial to reach the LCS Client. In these cases the E.164 number is not to be in international format. The country in which the national specific number(s) is (are) applicable is (are) also stored (or implied) in this case. Each call related identity may be associated with a specific external identity. Each call/session-related identity shall be associated with a logical client name.
Internal identity	O	Identifies the type PLMN operator services and the following classes are distinguished: - LCS client broadcasting location related information - O&M LCS client in the HPLMN - O&M LCS client in the VPLMN - LCS client recording anonymous location information - LCS Client supporting a bearer service, teleservice or supplementary service to the target UE This identity is applicable only to PLMN Operator Services.
Client name	O	An address string which is associated with LCS client's external identity (i.e., E.164 address). See note 2.
Client name type	O	Indication what is the type of the LCS client name. The type of the LCS client name can be one of the following: - Logical name - MSISDN - E-mail address[33] - URL[33] - SIP URL[34] - IMS public identity[35]
Override capability	O	Indication of whether the LCS client possesses the override capability (not applicable to a value added and PLMN operator service)
Authorized UE List	O	A list of MSISDNs or groups of MSISDN for which the LCS client may issue a non-call related MT-LR. Separate lists of MSISDNs and groups of MSISDN may be associated with each distinct external or non-call related client identity.

Priority	M	The priority of the LCS client – to be treated as either the default priority when priority is not negotiated between the LCS server and client or the highest allowed priority when priority is negotiated
QoS parameters	M	The default QoS requirements for the LCS client, comprising: - Accuracy - Response time - LCS QoS Class Separate default QoS parameters may be maintained for each distinct LCS client identity (external, non-call related, call related)
Service Coverage	O	A list of E.164 country codes for geographic areas [35a] where the LCS client offers its location services.
Allowed LCS Request Types	M	Indicates which of the following are allowed: - Non-call related CS-MT-LR/PS-MT-LR - Call/session related CS-MT-LR/PS-MT-LR - Specification or negotiation of priority - Specification or negotiation of QoS parameters - Specification or negotiation of Service Coverage parameter - Request of current location - Request of current or last known location
Local Co-ordinate System	O	Definition of the co-ordinate system(s) in which a location estimate shall be provided – details are outside the scope of the present document
Access Barring List(s)	O	List(s) of MSISDNs or groups of MSISDN for which a location request is barred
Service Identities	O	List of service identities allowed for the LCS client.
Maximum Target UE Number	O	The maximum number of the Target UEs in one LCS request. For a specific LCS Client, this parameter may have different values for different service identities.

NOTE 1: The LCS Client is identified with E.164 number or APN-NI. APN-NI is specified in TS 23.003 [17].

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

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

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

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

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

Table 10.9: Logical States for each LCS Privacy Class

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

For each LCS privacy class, the GMLC/PPR shall store the logical state of the class on a per-subscriber (or per subscriber MSP) basis. In addition, the permanent data indicated in Table 10.10 may be stored on a per subscriber (or

per subscriber MSP) basis when the logical provisioning state of the associated LCS privacy class is "provisioned". For the meaning of each LCS privacy class, refer to clause 9 and to TS 22.071 [4].
Moreover a list of allowed service types may be stored. The meaning of service types is defined in TS 22.071 [4].

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

LCS Privacy Class	Status	Additional GMLC Data when Class is provisioned
Universal Class	-	No additional data
Call/session Related Class	M	Indication of one of the following mutually exclusive options for any LCS client not in the external LCS client list: - Location not allowed - Location allowed without notification (default case) - Location allowed with notification - Location with notification and privacy verification; location allowed if no response - Location with notification and privacy verification; location restricted if no response
	O C	
	O C	External LCS client list: a list of zero or more LCS clients, with the following data stored for each LCS client in the list: - International E.164 address identifying a single LCS client or a single group of LCS clients that are permitted to locate this target UE - Restriction on the GMLC. If no value is stored for this data, there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. 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. If no value is stored for this data,

		there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. 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 [4]. - Restriction on the GMLC. If no value is stored for this data, there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. Possible values are: - Identified GMLCs only - Any GMLC in the home country - Indication of one of the following mutually exclusive options: - Location allowed without notification (default case)

		- Location allowed with notification - Location with notification and privacy verification; location allowed if no response Location with notification and privacy verification; location restricted if no response

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

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

Table 10.12a: Codeword handling information stored in the GMLC

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

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

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

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

3GPP TSG-SA2 Meeting #42
Sophia Antipolis, FR, 11th-15th October 2004

Tdoc ⌘S2-043321
(revised S2-043237)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **285** ⌘ **rev** **1** ⌘ Current version: **6.9.0** ⌘

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

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

Title:	⌘	Service type checking corrections
Source:	⌘	Ericsson
Work item code:	⌘	LCS2
Date:	⌘	12/10/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

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

Reason for change:	⌘	TS 23.271 is incomplete when describing the privacy checks. According to the specification, all privacy checks shall be done in H-GMLC/PPR, for Rel-6. However, some description regarding the handling of the service type checks, which is part of the privacy check functionality, is missing. Therefore, modifications are needed in order the TS to reflect this handling.
Summary of change:	⌘	Some clauses that refer to the privacy checks are modified in order to include the Service Type handling and the selection of the proper privacy indicator, in the GMLC. Moreover, table 10.11 in clause 10.3.2 is updated in order to be aligned to the respective table in Rel-5, as it was modified due to CR#89rev1.
Consequences if not approved:	⌘	There will be problems with the service type checking, as there is no certain handling mentioned in the TS at the moment and therefore different nodes might have different understanding on the issue.

Clauses affected:	⌘	9.5.3.5, 9.5.4, 10.3.2, A3

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

Other comments:	⌘	

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

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

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

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

<< First Modified Clause >>

9.5.3.5 Service type checking

If the SLPP contains service types, a~~n~~ CS-MT-LR/PS-MT-LR may be allowed ~~by the MSC/MSC server or SGSN~~ if the service type supplied by the ~~GMLC~~LCS client matches the identity of any service type contained in the UE's SLPP and any other GMLC restrictions associated with this service type in the SLPP are also met.

If the service type is correctly matched in this way and any GMLC restrictions are satisfied, the CS-MT-LR/PS-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 CS-MT-LR/PS-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 CS-MT-LR/PS-MT-LR shall be restricted.

<< Next Modified Clause >>

9.5.4 Indicator of privacy check related action

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

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

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

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

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

If both indicators are sent but indicating different actions and the call/session related criteria met in the serving node then an action according to the indicator with the looser action according to the definition in Annex A shall be chosen as shown in Annex A.3.

If the UE subscribes service types, then the result of the service type checking may be included in any of the privacy check indicators, as it is described in annex A.3.

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

<< Next Modified Clause >>

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

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

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

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

Table 10.9: Logical States for each LCS Privacy Class

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

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

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

LCS Privacy Class	Status	Additional GMLC Data when Class is provisioned
Universal Class	-	No additional data
Call/session Related Class	M O C O C	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 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. If no value is stored for this data, there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. 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 O C O C	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 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. If no value is stored for this data,

		there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. 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. If no value is stored for this data, there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. 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~~

Service type indication	Status	Additional GMLC 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. If no value is stored for this data, there is no restriction on GMLC and any GMLC is allowed to request location information for the UE. 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, the GMLC/PPR shall store the same pseudo-external identity table with HLR, which is shown in Annex C.

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

Table 10.12a: Codeword handling information stored in the GMLC

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

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

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

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

<< Next Modified Clause >>

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

In Rel-6 and later, the privacy checking function is moved from MSC/SGSN to H-GMLC/PPR of the target UE. H-GMLC/PPR selects one or two indicators of privacy check related action and sends the indicators to serving MSC/SGSN as shown in the clause 9.5.4. If the user subscribes Service Types, the resulting privacy setting shall be compared with the result of Service Type privacy checking, and the looser condition shall be selected. The Service Type check result may be included in any of the two privacy indicators, provided that the MT-LR is allowed for the relative privacy class.

If the serving MSC/SGSN receives the indicators from H-GMLC, the serving node selects the privacy related action according to the flow diagram shown in Fig. A-2.

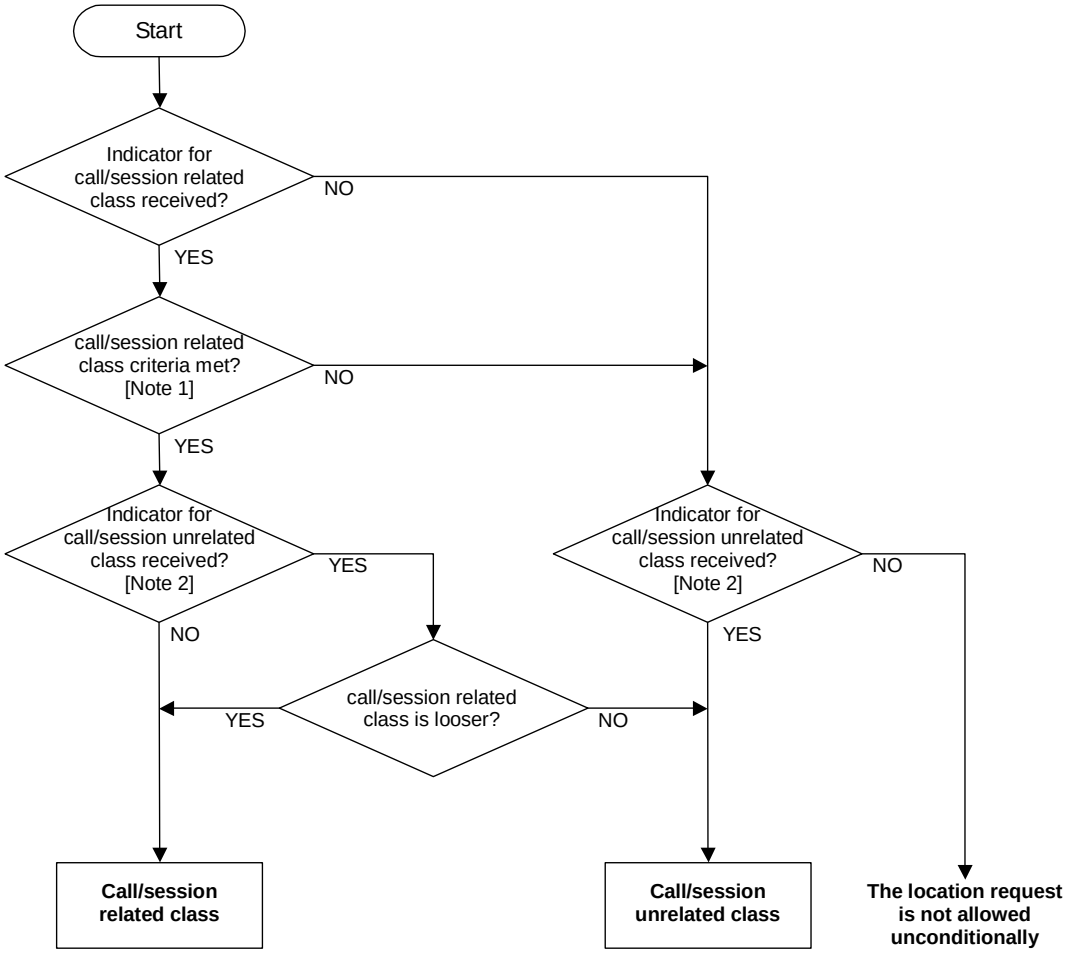

Figure A.2: Privacy related action selection flow diagram of the serving node

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

Note 2: A prior change makes this check unnecessary; since the call unrelated indicator is mandatory therefore the result is always "YES".

3GPP TSG-SA2 Meeting #42
Sophia Antipolis, France, 11th-15th October 2004

Tdoc ⌘ S2-043322
(Revised S2-043239)

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.271** **CR** **287** ⌘ **rev** **1** ⌘ Current version: **6.9.0** ⌘

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

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

Title:	⌘	QoS Class at Deferred Location Request
Source:	⌘	Ericsson
Work item code:	⌘	LCS2
Date:	⌘	20/9/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:
Ph2 *(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)*
Rel-7 *(Release 7)*

Reason for change:	⌘	In the Deferred MT-LR the handling of QoS is not visible. Clarifications are needed on how the indication of accuracy satisfaction is forwarded and how the QoS Class affects the sending of LCS Service Response.
Summary of change:	⌘	A sentence is added to clarify that Subscriber Location Report may include an indication whether the requested accuracy is satisfied. A second change is that it is stated that V-GMLC sends the LCS Service Response in accordance with the requested QoS Class. A reference to clause 9.1.1 is added for the detailed description.
Consequences if not approved:	⌘	Indicator of accuracy satisfaction is not visible in the subscriber location report, in case of Deferred MT-LR. The handling of QoS class is not in accordance with the normal MT-LR

Clauses affected:	⌘	9.1.8, 9.1.9

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

⌘

Other comments: ⌘

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

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

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

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

<< First Modified Clause >>

9.1.8 Mobile Terminating Deferred Location Request – UE available event

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

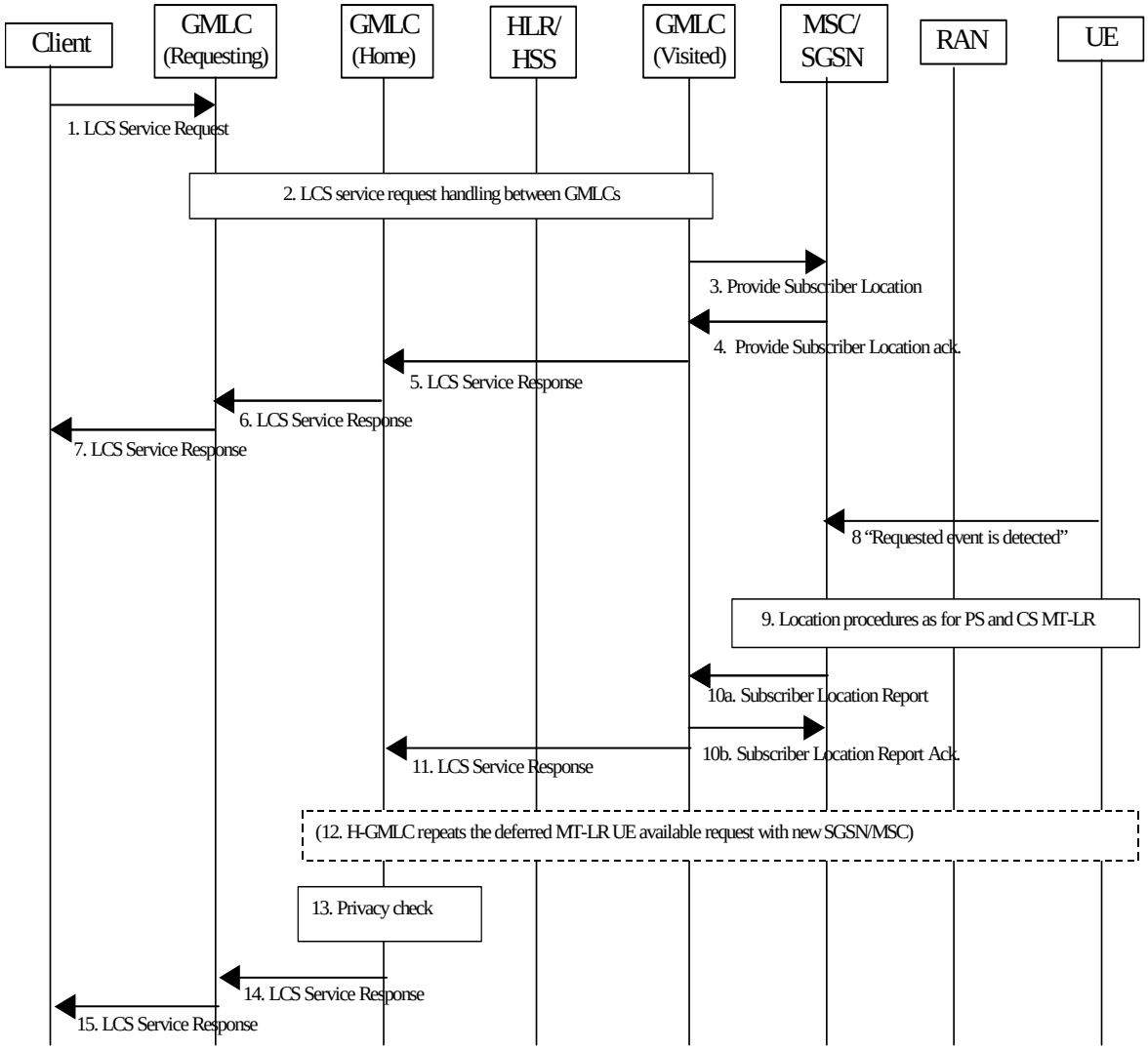

Figure 9.6a: General Network Positioning for a Deferred MT-LR with UE available event

9.1.8.1 Deferred Location Request Procedure

1) The LCS Service Request shall contain an indication of the requested event i.e. UE available. The R-GMLC assigns a LDR reference number to this LCS Service request.

2) LCS service request handling between GMLCs as described in clause 9.1.1. The information received by the R-GMLC is transferred to the V-GMLC via the H-GMLC, including the LDR reference number and the H-GMLC address.

3) The V-GMLC sends the UE available event to MSC/SGSN in the Provide Subscriber Location request (deferred) and includes the LDR reference number and the H-GMLC address in the request.

Note: It shall be possible to issue the deferred location requests for the UE available event, even in case there is an ongoing previous MT-LR for the same UE.

4) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned with a suitable cause. If the SGSN/MSC can support the deferred location request for the specified event, a Provide Subscriber Location ack. shall be returned to the V-GMLC without a location estimate. The SGSN/MSC may record charging information for an accepted deferred location request.

5) V-GMLC returns the LCS Service Response to H-GMLC to notify whether the request was successfully accepted or not. The V-GMLC may record charging information for an accepted deferred location request.

6) H-GMLC returns the LCS Service Response to R-GMLC to notify whether the request was successfully accepted or not. The H-GMLC may record charging information for an accepted deferred location request.

7) The R-GMLC then returns the LCS Service Response to the LCS Client to notify whether the request was successfully accepted or not. When the R-GMLC returns the LCS Service Response to the LCS Client, the LDR reference number assigned by the R-GMLC shall be included. The R-GMLC may record charging information for an accepted deferred location request.

9.1.8.2 Location Report Procedure

8) Immediately following step 3, the SGSN/MSC shall verify if the requested event is already satisfied (e.g. UE available inferred from a current transaction) or can be invoked immediately (e.g. by paging the UE and receiving a page response). If the requested event is not already satisfied, the SGSN/MSC waits until it has occurred or until some maximum time has expired.

   In case the SGSN/MSC receives an indication that the UE has moved to another SGSN/MSC, while it is waiting for the requested event to happen, SGSN/MSC shall immediately send a Subscriber Location Report to the V-GMLC, which forwards it to the H-GMLC. The report shall include the privacy related action, reference number and H-GMLC address that were included in the Provide Subscriber Location request and SGSN/MSC shall also include the address of the new SGSN/MSC, if available. (H-GMLC shall in this case reinitiate the MT-LR with the new SGSN/MSC, see step 12.)

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

   If either security or privacy check related actions fail, e.g. because the location information is not session or call related, the SGSN/MSC shall send a Subscriber Location Report with the reference number and H-GMLC address that was included in the Provide Subscriber Location with appropriate error cause indicating termination of the deferred location request.

10) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall include the reference number that was included in the Provide Subscriber Location, the H-GMLC address, ~~and~~ an indication that this is a response to a previously sent deferred location request and may also include the indication whether the obtained location estimate satisfies the requested accuracy or not (provided that this indication is obtained from RAN with the location estimate). The SGSN/MSC may record charging information.

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

11) V-GMLC sends the LCS Service Response to the H-GMLC with an indication of the event occurrence and the LDR reference number. The LCS Service Response is sent in accordance with the requested QoS Class, as described in clause 9.1.1 for common MT-LR.

12) In case the LCS Service Response indicates to H-GMLC that the mobile has moved to another SGSN/MSC, the H-GMLC shall send the deferred MT-LR with UE available event to the V-GMLC (previous or new), which forwards the request to the new SGSN/MSC, as described in step 2 onwards.

13) The H-GMLC performs the privacy check as described in clause 9.1.1.

14) The H-GMLC sends the LCS Service Response to R-GMLC.

15) The R-GMLC sends the LCS Service Response to the LCS Client. When the R-GMLC returns the LCS Service Response to the LCS Client, the LDR reference number that was sent to the LCS Client in step 3 shall be included.

<< Next Modified Clause >>

9.1.9 Deferred Location Request Procedure for the change of area event

Figure 9-6d illustrates the procedures for a Deferred Location Request where the Location Report is returned to the network by the UE following a change of area event. An area event occurs when the UE leaves, enters or is within a target area as defined by geographical area, PLMN identity, country code or geopolitical name of the area. Details of the target area are contained in the LCS Service Request message, see clause 5.5.1.

The PLMN operator may choose to use another mechanism (such as SIM Application Toolkit) for the transfer and detection mechanism of the Area Definition and change of area event information to the UE. In this case, the GMLCs handle steps 2 to 7 and 11 to 14 differently from that shown below. An alternative mechanism is detailed in Annex F

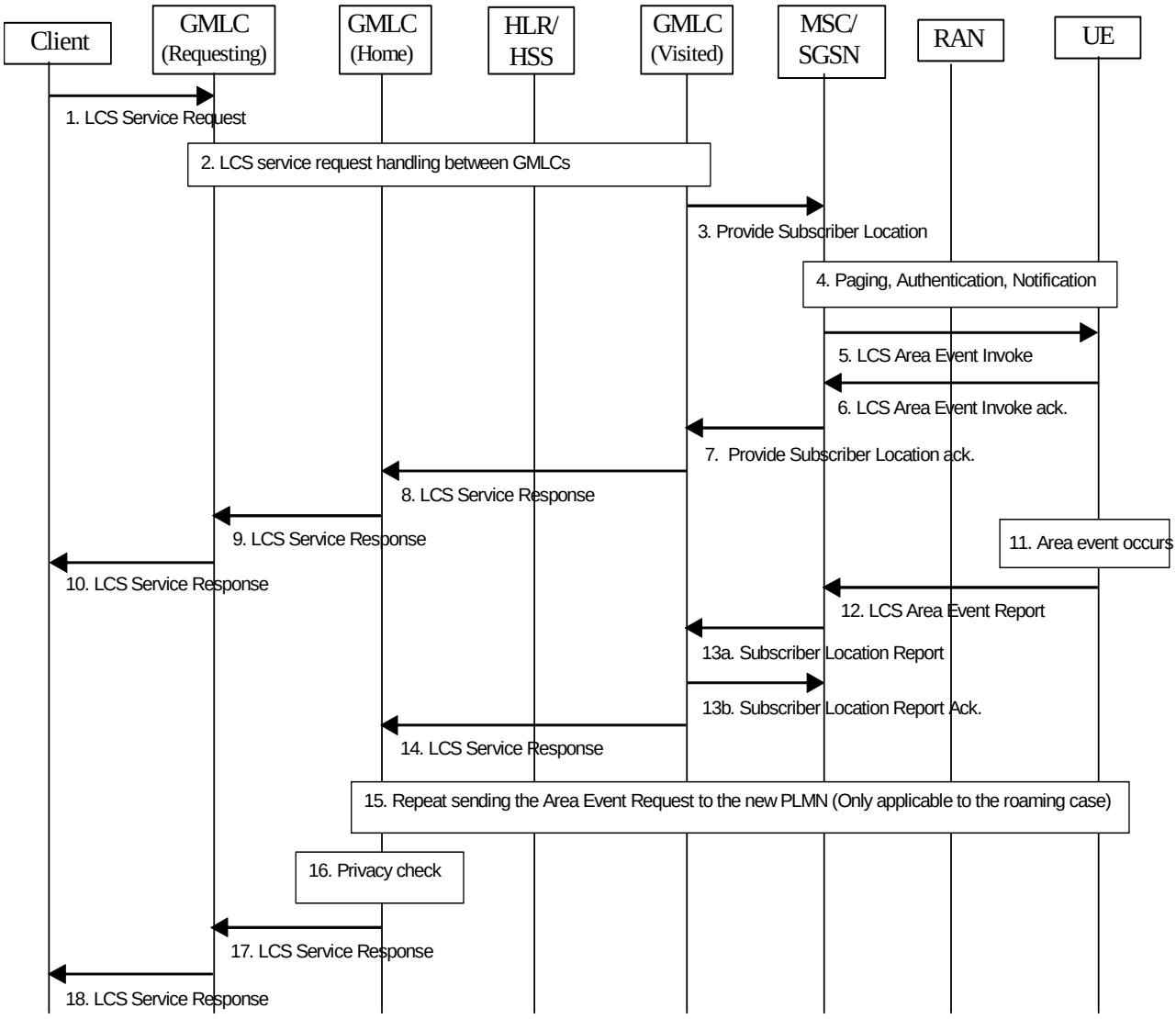

Figure 9.6d: Deferred MT-LR procedure for the Area event

1) The LCS Service Request contains the change of area type deferred location request information, i.e. details of the target area and the nature of the event, whether the event to be reported is the UE being inside, entering into or leaving the target area. The LCS service request may specify the validity time, i.e. start time and stop time, for

the deferred location request and R-GMLC may cancel the deferred location request as described in clause 9.1.9.1. In addition, when validity time of a pending area event request in the target UE expires, the UE shall delete the pending deferred location request. The LCS Service Request shall contain an indication of the minimum interval time between area event reports, if applicable. The LCS service request shall contain the information whether the deferred area event may be reported one time only, or several times. If the change of area event is reported one time only, the Location Service request shall be completed after the first area event has occurred. The R-GMLC assigns a LDR reference number to this LCS Service request. If the target area is expressed by local coordinate system or geopolitical name, the R-GMLC shall convert the target area to geographical area expressed by a shape defined in TS23.032. In addition to the target area definition, the LCS Client may include the country code of the target area in the area event request.

2) LCS service request handling between GMLCs as described in clause 9.1.1. If indication of the requested location estimate is included in the area event request, the R-GMLC should record this indication and any relevant parameters such as QoS. The information received by the R-GMLC is transferred to the V-GMLC via the H-GMLC, including the LDR reference number and the H-GMLC address.

   If the H-GMLC notices that the current visited PLMN does not serve the target area, it may generate a modified deferred LCS service request in order to get notified when the target UE enters a PLMN that serves the target area. The modified target area event is that the target UE enters one of the PLMNs that serve the original target area. Note that the new area event may include multiple PLMNs (identified by PLMN IDs) if there are more than one PLMN that serves the original target area, based on the stored PLMN list and the corresponding estimated coverage. The H-GMLC then generates a new location request with the new defined area event and the same rest of the information in the original request.

   The new location request is sent to the target UE via the current V-GMLC. The H-GMLC keeps the original area event location service request pending for as long as determined by the validity time of the request. When the UE enters one of the pre-defined PLMNs, it sends an area event location report to H-GMLC. The H-GMLC then sends the original area event location service request to the UE via the new V-GMLC. If the H-GMLC cannot derive a list of PLMNs that may cover the target area, and the current visited network does not cover the target area, the H-GMLC may reject the request.

3) If the received target area is expressed by a shape defined in TS23.032, V-GMLC converts the target area into an Area Definition consisting of the corresponding list of cell identities, location areas or routing area. If the V-GMLC is not able to translate the target area into network identities, it shall reject the request and send an LCS service response to H-GMLC with the appropriate error cause.
   If the received target area is expressed by country code or PLMN identity, the V-GMLC shall use the country code or PLMN identity as the Area Definition.
   The V-GMLC sends the Area Definition to MSC/SGSN in the Provide Subscriber Location request (deferred) and includes the LDR reference number and the H-GMLC address in the request.
   The message shall define whether the event to be reported is the UE being inside, entering into or leaving the area. The message shall also include the validity period of the location request, the minimum interval time between area event reports, the information whether the deferred area event may be reported one time only or several times, if applicable.

4) The MSC/SGSN verifies the UE capabilities with regard to the change of area event. If either the MSC/ SGSN or the UE does not support the deferred location request for the change of area event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned with a suitable cause in step 7. If the UE is in idle mode, the core network performs paging, authentication and ciphering. If privacy notification/verification is requested, the MSC/SGSN sends an LCS Location Notification Invoke message to the target UE indicating the change of area type deferred location request and whether privacy verification is required. LCS Location Notification is further specified in clauses 9.1.2 and 9.1.6. If privacy verification was requested, the UE returns an LCS Location Notification Return Result to the MSC/SGSN indicating whether permission is granted or denied.

5) The MSC/SGSN sends the LCS Area Event Invoke to the UE carrying the Area Definition, other area event information, the LDR reference number and the H-GMLC address. The message shall also define whether the event to be reported is the UE being inside, entering into, leaving the area. The message shall also include the validity period of the location request, the minimum interval time between area event reports and the information whether the deferred area event may be reported one time only, or several times, if applicable.

6) If the LCS Area Event Invoke is successfully received by the UE and the UE supports the change of area type deferred location request, the UE sends acknowledgement to MSC/SGSN and begins monitoring for the change of area event. The UE shall determine whether it is inside, entering into or leaving the target area by comparing

the current serving cell identity, location area, routing area, PLMN identity or country code to the Area Definition received from the MSC/SGSN. In case of soft handover, it is sufficient if one of the cells belongs to the target area. In case the Area Definition consists of a location or routing area, PLMN or country identity the UE shall check for the area event during the normal location or routing area update procedure. The change of area event detection mechanism must not influence on the normal UE cell selection and reselection procedures. If the UE does not support the deferred location request (for temporary or permanent reasons), it shall send the LCS Area Event Invoke ack. with the appropriate error cause.

7) If either the MSC/ SGSN or the UE does not support the deferred location request for the change of area event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned to the V-GMLC with a suitable cause. If both of the SGSN/MSC and UE supports the deferred location request for the change of area event, a Provide Subscriber Location ack. shall be returned to the V-GMLC without a location estimate. MSC/SGSN shall include the result of the notification/verification in the response to the V-GMLC, if the notification/verification is needed. The response message shall include the LDR reference number and the H-GMLC address. The change of area event invoke result shall be also included, if necessary. After sending the Provide Subscriber Location ack to the V-GMLC, the deferred location request shall be completed in the MSC/SGSN. The SGSN/MSC may record charging information for an accepted area event request.

8) to 10) V-GMLC returns the LCS Service Response via H-GMLC and R-GMLC to the LCS Client to notify whether the request was successfully accepted or not. When the R-GMLC returns the LCS Service Response to the LCS Client, the LDR reference number assigned by the R-GMLC shall be included. After sending the LCS Service Response to the H-GMLC, the deferred location request shall be completed in the V-GMLC. The V-GMLC or R-GMLC may record charging information for an accepted area event request.

11) UE detects that the requested area event has occurred.

12) Before sending the LCS Area Event Report the UE shall establish either a CS radio connection or PS signalling connection as specified in clauses 9.2.1 and 9.2.2. The UE sends the LCS Area Event Report to the VMSC/SGSN including the original LDR reference number and the H-GMLC address. The report shall also include the result of the notification/verification procedure, if the notification/verification is needed.

When the MSC/SGSN receives the report and it can handle this report, an acknowledgement as a response should be sent to the UE. If the UE does not receive any response from the MSC/SGSN after sending the report, i.e. the current MSC/SGSN does not support the deferred location request for the area event (for temporary or permanent reasons), the UE may re-send the report more times. If the UE always does not receive the response, the UE shall stop sending the report, then record a corresponding flag to indicate that a report has been sent unsuccessfully. When the UE performs location update and detects the LAI or RA is changed, if the flag has been set, the UE shall send the report to the corresponding MSC/SGSN, and the flag will be cleared upon a success of the sending.
If the UE was requested to report the change of area event one time only, the deferred location request shall be completed. In case multiple reports were requested, the UE must not send a repeated LCS Area Event Report more often than the requested minimum interval indicated in the LCS Area Event Invoke.

Editor's Note: It could be useful to have MSC/SGSN repeat the notification procedure with the target UE after the UE has reported the change of area event, but this is for further study.

13) The MSC/SGSN sends the subscriber location report to its associated V-GMLC with an indication of the event occurrence, the LDR reference number, ~~and~~ the H-GMLC address and may also include the indication whether the obtained location estimate satisfies the requested accuracy or not (provided that this indication is obtained from RAN with the location estimate). V-GMLC sends an acknowledgement to MSC/SGSN in step 13b and the MSC/SGSN may record charging information.

14) The V-GMLC sends the LCS Service Response to the H-GMLC with an indication of the event occurrence, the LDR reference number and the H-GMLC address. The LCS Service Response is sent in accordance with the requested QoS Class, as described in clause 9.1.1 for common MT-LR. The LDR reference number and the H-GMLC address will be used to identify the source of the original deferred location request in the case that the UE has relocated before the area event occurred. The V-GMLC may record charging information.

15) In case the UE moves to another PLMN of the PLMN identities list, according to the PLMN identity the UE shall determine whether the Area Definition of the target area is available. If it is not available, the UE shall report that it has roamed into a new PLMN, including the new PLMN identity and the LDR reference number. The H-GMLC shall transfer the original area event request to the V-GMLC of the new PLMN. The procedure should be continued as described in step 2 and onwards where the Area Definition of the new PLMN shall be

downloaded to the UE. Otherwise, the UE monitors the area event in the new PLMN, does not inform the H-GMLC that it has entered into a new PLMN.

16) The H-GMLC performs the privacy check as described in clause 9.1.1.

17) The H-GMLC sends the LCS Service Response to R-GMLC. Unless multiple reports were requested, the deferred location request shall be completed in the H-GMLC after sending the LCS Service Response to the R-GMLC. The H-GMLC may record charging information.

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

The R-GMLC sends the LCS Service Response to the LCS client, the LDR reference number that was sent to the LCS Client in step 10 shall be included in the response. If the location estimate of the target UE is requested in the request and the location estimate was successfully obtained, the R-GMLC shall put the obtained location estimate into the LCS Service Response. If the location estimate of the target UE is requested in the request but the location estimate could not be obtained, the R-GMLC sends the LCS Service Response without the location estimate. Unless multiple reports were requested, the deferred location request shall be completed in the R-GMLC after sending the LCS Service Response to the LCS client. The R-GMLC may record charging information.

3GPP TSG SA2#43
Seoul, Korea, 15-19 November 2004

Tdoc ⌘S2-043740

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **294** ⌘ **rev** **1** ⌘ Current version: **6.9.0** ⌘

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

Title:	⌘	NA-ESRD Provision for NI-LR Location Based Routing in North America
Source:	⌘	Siemens, Lucent, Cingular Wireless
Work item code:	⌘	LCS2
Date:	⌘	15/11/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

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

Reason for change:	⌘	To support location based routing for emergency calls in North America, an MSC can request an ESRK from the GMLC using the NI-LR procedure. If an ESRK is not provided, an MSC would use a default ESRK associated, for example, with the originating cell for the emergency call. Since signaling to a PSAP may have to use an ESRD rather than ESRK, the location based NI-LR procedure needs to be extended to support return of an ESRD from a GMLC instead of an ESRK. With this capability, an MSC does not need to provision, store, and administer NA-ESRDs or send an NA-ESRD to a GMLC. As long as an MSC sends a GMLC the cell identity, the GMLC can translate the cell identity to an NA-ESRD.
Summary of change:	⌘	The NI-LR procedure using location based routing for North American emergency calls is extended to allow a GMLC to return either an NA-ESRK or an NA-ESRD when an VMSC or MSC server requests an NA-ESRK in a MAP Subscriber Location Report. The returned NA-ESRK or NA-ESRD will be used by the VMSC or MSC server to route the call to the emergency services PSAP. If no NA-ESRK or NA-ESRD is returned by the GMLC, the VMSC or MSC server uses a default NA-ESRK, NA-ESRD or other default number for routing. The addition of allowing default NA-ESRD or other default number based routing provides more flexibility.
Consequences if not approved:	⌘	It will not be possible to support location based routing to a PSAP with call setup signaling based on an ESRD rather than an ESRK. It will not be possible to simplify the VMSC or MSC server by removing ESRD administration.

Clauses affected:	⌘	9.1.5A.3, 9.1.5A.4				
Other specs	⌘	**Y**	**N**	Other core specifications	⌘	29.002
		X				

Affected:		
	X	Test specifications
	X	O&M Specifications
Other comments:	⌘	The proposed change does not affect a PLMN in which only an ESRK but not ESRD is provided by GMLC to support location based routing since the GMLC can continue to return only an ESRK or nothing in a MAP Subscriber Location Report response. In the latter case, the VMSC or MSC server is able to route to a PSAP using a default ESRK or ESRD as before.

********** BEGIN OF MODIFIED SECTION **********

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

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

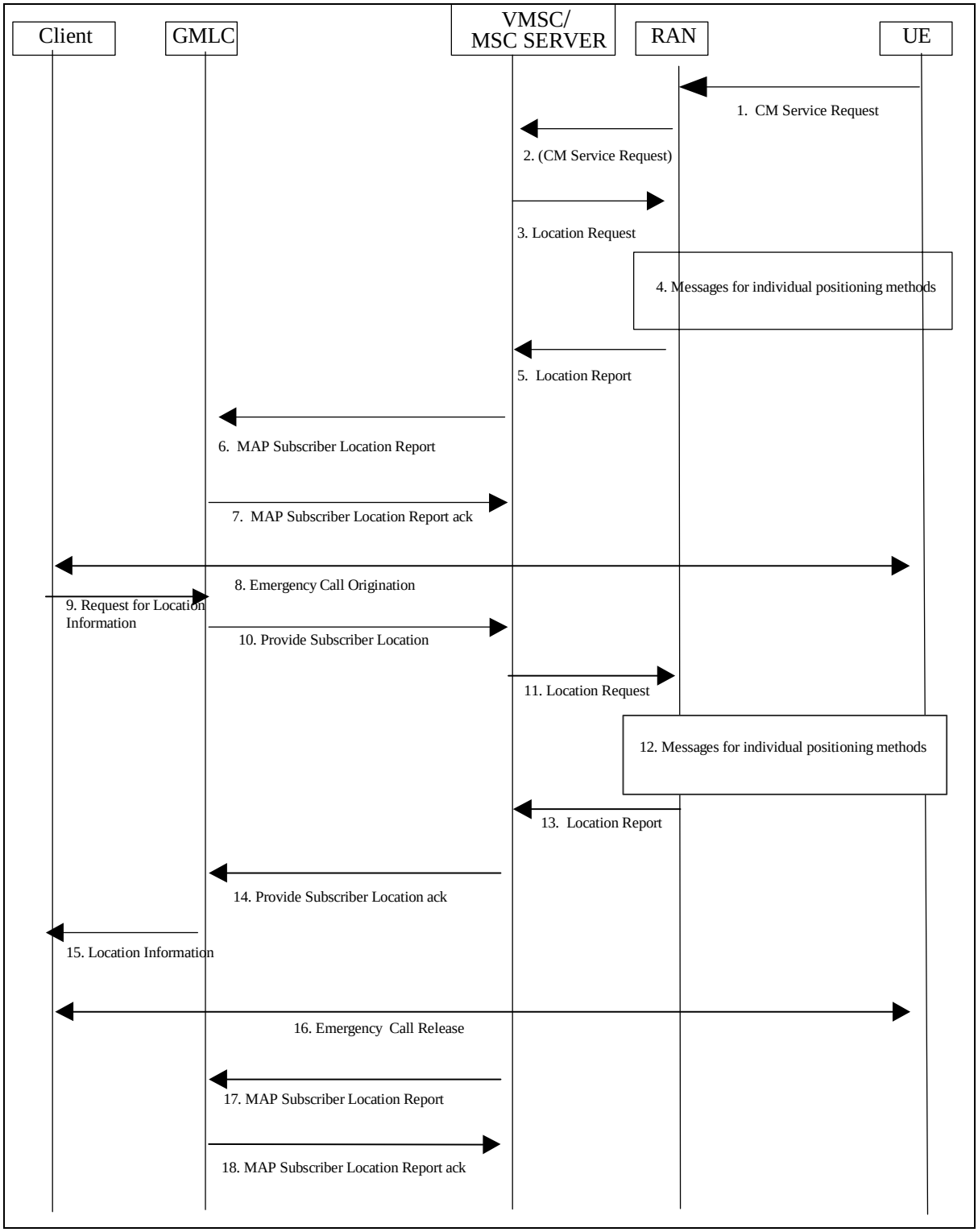

Figure 9.4A: Positioning for a NI-LR Emergency Service Call using Location Based Routing

9.1.5A.1 Location Preparation Procedure

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

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

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

9.1.5A.2 Positioning Measurement Establishment Procedure

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

9.1.5A.3 Location Calculation and Release Procedure

5) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate. If a failure is received, the VMSC/MSC server initiates emergency call setup using the normal NI-LR procedures.

6) The VMSC/MSC server sends a MAP Subscriber Location Report to a GMLC associated with the emergency services provider to which the emergency call will be sent. This message shall carry any location estimate returned in step 5, the age of this estimate and may carry the MSISDN, IMSI, IMEI of the calling UE, the information about the positioning method used and the serving cell identity or SAI of the UE. In case a SIM-less UE is used to make the emergency call, the IMEI shall be always sent and the MSISDN shall be populated with a non-dialable callback number as specified in clause 6.4.3. The message shall also indicate the event that triggered the location report. Any NA-ESRD and NA-ESRK that was assigned by the VMSC/MSC server shall be included. The message shall also include an indication that the VMSC/MSC server supports the capability to replace an NA-ESRK or NA-ESRD value with the one assigned by the GMLC. The VMSC/MSC server and GMLC may record charging information.

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

9.1.5A.4 Location Preparation Procedure

8) The emergency call procedure is applied. The VMSC/MSC server, RAN and UE continue the normal procedure for emergency call origination towards the appropriate emergency services client. Call setup information sent into the PSTN may include the UE location plus information that will enable the emergency service provider to request UE location at a later time (NA-ESRD or NA-ESRK in North America). The NA-ESRK or NA-ESRD used shall be the one received from the GMLC. If a NA-ESRK or NA-ESRD is not received from the GMLC then the VMSC/MSC server shall ~~use~~ employ default routing for the call using ~~the~~a default NA-ESRK, default NA-ESRD or other default number~~for the call~~ as in 9.1.5.1 step 3.

9) At any time after step 8, the emergency services LCS client may request location information.

10) At any time after step 6, the GMLC may send a MAP Provide Subscriber Location message to the VMSC/MSC server. This message includes a QoS with higher delay and higher horizontal accuracy required for an emergency call. In case a SIM-less UE is used to make the emergency call, the IMEI shall be included in the message.

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

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

9.1.5A.5 Positioning Measurement Establishment Procedure

12) same as step 4.

9.1.5A.6 Location Calculation and Release Procedure

13) same as step 5.

14) The VMSC/MSC server returns the location information and its age, the information about the positioning method used and the serving cell identity or SAI of the UE to the GMLC. The GMLC shall replace the previously stored low accuracy location information with the higher accuracy information for later retrieval by the emergency services LCS client. The VMSC/MSC server and GMLC may record charging information.

15) The GMLC may forward the information received in the previous step to the emergency services LCS client. The client is expected to have requested this information from GMLC before. The information about the positioning method used may be sent with this location information from the GMLC to the LCS client.

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

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

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

********** END OF MODIFIED SECTION *********

3GPP TSG- SA WG2 Meeting #43
Seoul, Korea, 15th – 19th November 2004

Tdoc ⌘ S2-043524

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **289** ⌘ **rev** **1** ⌘ Current version: **6.9.0** ⌘

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

Title:	⌘	Correction in section 7.1.1
Source:	⌘	ZTE
Work item code:	⌘	LCS2
Date:	⌘	11/4/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The last sentence of the second paragraph in section 7.1.1 describes that the MSC Server or SGSN shall not send the SAI to GMLC, but actually the SAI can be sent to the GMLC in the Subscriber Location Report in such cases like North American Emergency Service(according to the lastest 29.002 specification.), and other cases will also exist where the SAI shall be sent to GMLC.
Summary of change:	⌘	Delete the last sentence of the second paragraph in the section 7.1.1.
Consequences if not approved:	⌘	The Last sentence is redundant and not correct.

Clauses affected:	⌘	7.1.1			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

<< First changed clause >>

7.1 LCS signaling between Access and Core Networks

The core network sends location requests to the access network, which then sends the corresponding responses back to the core network.

Communication between access and core networks is accomplished through Iu interface in UMTS whereas the A, Gb and Iu interfaces are used for the purpose in GSM (see TS 25.305 [1] and TS 43.059 [16]).

7.1.1 Core network Location Request

The core network request for a location estimate of a target UE shall contain sufficient information to enable location of the Target UE according to the required QoS using any positioning method supported by the PLMN and, where necessary, UE. For location services the core network may request the geographical co-ordinates of the Target UE.

In Iu mode the core network may also request in which Service Area the Target UE is located. The Service Area information may be used for routing of corresponding Emergency calls, or for CAMEL services.~~(The MSC Server or SGSN shall not send the Service Area Identity to GMLC).~~

In A/Gb mode this corresponds to the usage of Cell ID in the core network.It should be noted that the Service Area concept is different from the Localized Service Area concept used for SoLSA services.

When the location of a Target UE in Idle Mode is requested, the core network shall determine which RAN entity is associated with the Target UE.

<< End of changed clause >>

3GPP TSG-SA2 Meeting #43
Seoul, Korea, 15th-19th October 2004

Tdoc ⌘S2-043757
(Revised S2-043612)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **295** ⌘**rev** **1** ⌘ Current version: **6.9.0** ⌘

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

Title:	⌘	POI applicability
Source:	⌘	Ericsson & Lucent
Work item code:	⌘	LCS2
Date:	⌘	10/11/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	TS 23.271 has two ambiguous chapters, regarding the POI applicability. Chapter 9.1 describes the case when MT-LR comes with the privacy override capability; according to the text *"In this case the H-GMLC is not involved to the location procedures and the privacy check procedures in H-GMLC/PPR is skipped".* On the other hand, chapter 9.5.2 states that the POI applicability is checked in the serving node and *"… if the POI is ignored the MSC evaluates the privacy options in the UE subscriber's subscription profile (assuming that this is held in the MSC server) or evaluates the received privacy related action indicators".* It seems that there is a contradiction between these two chapters, since the H-GMLC is not involved in this process and will not send any privacy check related action indicators to MSC.
Summary of change:	⌘	Some clauses that refer to MT-LR in general, Emergency MT-LR and privacy procedures are modified in order to include some corrections regarding the handling of the privacy override indicator. According to those modifications the requesting GMLC must also check the POI applicability. The V-GMLC sends the POI and a privacy indicator set to the value "not allowed" towards MSC/SGSN. The serving node performs POI applicability check and depending on the result, it may proceed with the location request unconditionally, or rejects the request, if it is indicated to do so, or performs the privacy checks, if the privacy indicator is missing.
Consequences if not approved:	⌘	In case of POI is judged to be not applicable by the serving node, then according to the present description, the MSC/SGSN reads the privacy indicator. But this indicator has not been received, because the H-GMLC/PPR does not participate in the procedure.

Clauses affected:	⌘	9.1, 9.1.1A, 9.5.1, 9.5.4			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

<< First Modified Clause >>

9.1 Mobile Terminating Location Request

The MT-LR procedures for the location request from the LCS client which does not have the privacy override capability are described in the chapter 9.1.1.

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

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

<< Next Modified Clause >>

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

This clause describes how an emergency location request may be handled similarly to a normal location request. This method should be restricted to those countries where there is not a national requirement to provide location for callers who are either roaming or making an emergency call from a SIM-less UE. It is also appropriate to use this method to provide location for lawful intercept services where allowed by national regulation.

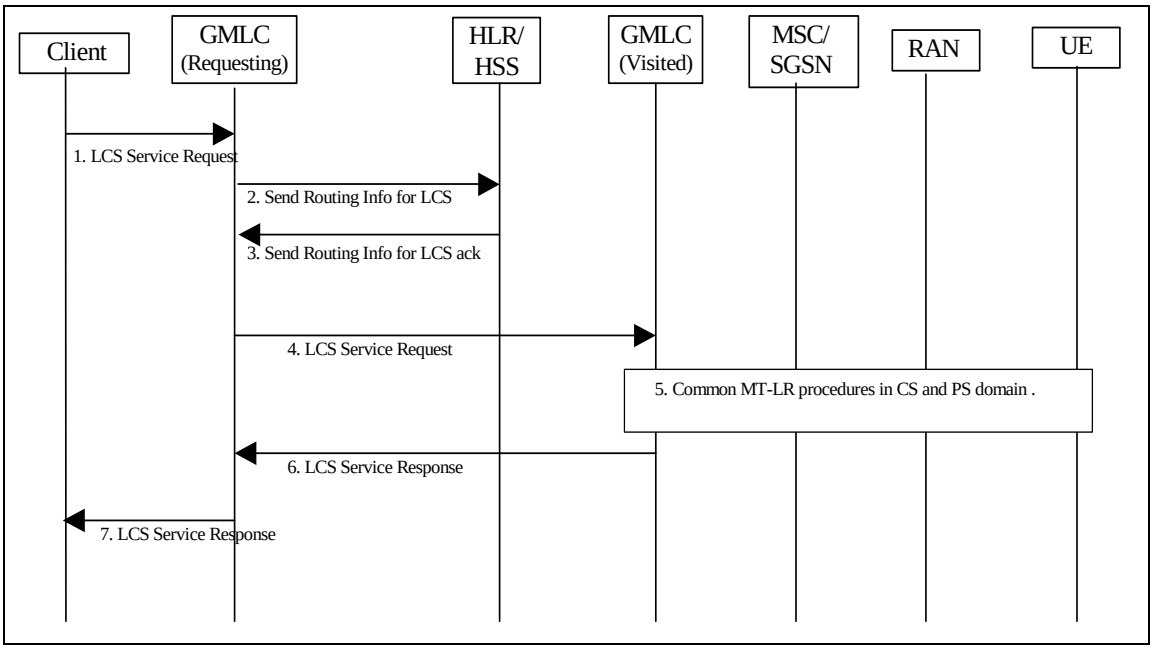

Figure 9.1A: Network Positioning for an Emergency MT-LR

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

2) If the R-GMLC already knows IMSI for the particular MSISDN, (e.g. from a previous location request) and the VMSC/MSC server address or SGSN address, this step and step 3 may be skipped. Otherwise, the R-GMLC

sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI or MSISDN of this UE.

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

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

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

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

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

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

7) R-GMLC sends the location service response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The location service response from the GMLC to the LCS client may contain the information about the positioning method used. After receiving (stage 3) acknowledgement from the LCS client, the R-GMLC may record charging information both for 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 5 of figure 9.1A are described in 9.1.2 and 9.1.6.

<< Next Modified Clause >>

9.5.2 Privacy Procedures

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

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

In case of an Emergency Services location request, based on the location of the VMSC/MSC Server/SGSN and the R-GMLC, the V-GMLC evaluates whether to accept or ignore the received POI, according to the definition in clause 9.1.5. If privacy override is not allowed, then the V-GMLC rejects the request.

In case the privacy override is allowed, ~~T~~the POI is transferred from the GMLC to the VMSC/MSC Server/SGSN in the location request. Based on the location of the GMLC the VMSC/MSC Server/SGSN evaluates whether to accept or ignore the received POI according to the definition in clause 9.5.1.

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

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

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

<< Next Modified Clause >>

9.5.4 Indicator of privacy check related action

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

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

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

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

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

If both indicators are sent but indicating different actions and the call/session related criteria met in the serving node then an action according to the indicator with the looser action according to the definition in Annex A shall be chosen as shown in Annex A.3.

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

3GPP TSG-SA2 Meeting #43
Seoul, Korea, 15th – 19th Nov 2004

Tdoc ⌘ S2-043853

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.271** **CR** **288** ⌘ **rev** **2** ⌘ Current version: **6.9.0** ⌘

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

Title:	⌘	Correction on the location service request
Source:	⌘	ZTE
Work item code:	⌘	LCS2
Date:	⌘	11/4/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	The example of requested type of location of LIR shall also include the “initial location”.
Summary of change:	⌘	Add the “initial location” to the requested type of Location.
Consequences if not approved:	⌘	Some confusion will occur.

Clauses affected:	⌘	5.5.1

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

Other comments: ⌘

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

<< First changed clause >>

5.5 Information Flows between Client and Server

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

Any of the information flows here indicated may not be externally realized if the information does not flow over an open interface.

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 OMA based on requirements set by TS 22.071 and TS 23.271.

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

- Target UE identity (either verinym or pseudonym);
- LCS Client identity;
- Service identity, if needed;
- Response method (SYNC or ASYNC), if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Type of Event definition, i.e. UE available or change of area, applicable to deferred location requests only;
- Definitions for change of area type deferred location requests. Following parameters may be defined, if needed;
    a) Indication for event trigger, i.e. UE enters, leaves or is within requested target area;
    b) Indication of either a single event report or multiple event reports;
    c) Minimum interval time between area event reports, if multiple event reports is requested;
    d) Indication of the requested location estimate; i.e. whether the location estimate of the target UE should be contained in the change of area event report;
- Start time, stop time (i.e. specifying the validity time of LCS request), if needed
- Interval, applicable to periodical requests only;
- Requested Quality of Service information, if needed, i.e. accuracy, response time and LCS QoS Class;
- Requested type of location, i.e. ~~current location or last known location~~ "current location", "current or last known location" or "initial location" applicable to LIR only (current location is only available for LDR);
- Priority, if needed;
- Service coverage (i.e. E.164 country codes for geographic areas [35a]), if needed;

- Requested maximum age of location, if needed;
- Local coordinate reference system, if needed;
- Target area, i.e. geographical area expressed as one of the following format, if needed.

  a) a shape defined in TS 23.032

  b) local coordinate system

  c) E.164 country code for a geographic area [35a]

  d) PLMN identity

  e) geopolitical name of the area (e.g. London)

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

<< End of changed clause >>

3GPP TSG-SA2 Meeting #43
Seoul, Korea, 15th – 19th Nov 2004

Tdoc ⌘ S2-043855

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.271** **CR** **290** ⌘ **rev** **2** ⌘ Current version: **6.9.0** ⌘

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

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

Title:	⌘	Clarification on the LCS authorisation response
Source:	⌘	ZTE
Work item code:	⌘	LCS2
Date:	⌘	11/4/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	The section 9.1.1.1 specify that in case the subscriber changed his privacy information,the LCS authorisation response shall be also used to indicate this to the GMLC. But there is no such an indication defined in the Lpp interface in section 7.4.2. According to the section 9.1.1.2 when the UE subscribers privacy information has been changed in the PPR the LCS Privacy Profile Update shall be send to the GMLC (H-GMLC) to indicate this.
Summary of change:	⌘	Delete the last sentence in the section 9.1.1.1.
Consequences if not approved:	⌘	It is confused whether the LCS authorisation response in the Lpp interface shall include a parameter to indicate the subscriber has changed his privacy information.

Clauses affected:	⌘	9.1.1.1			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:

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

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

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

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

<< First changed clause >>

9.1.1.1 LCS Authorisation request

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

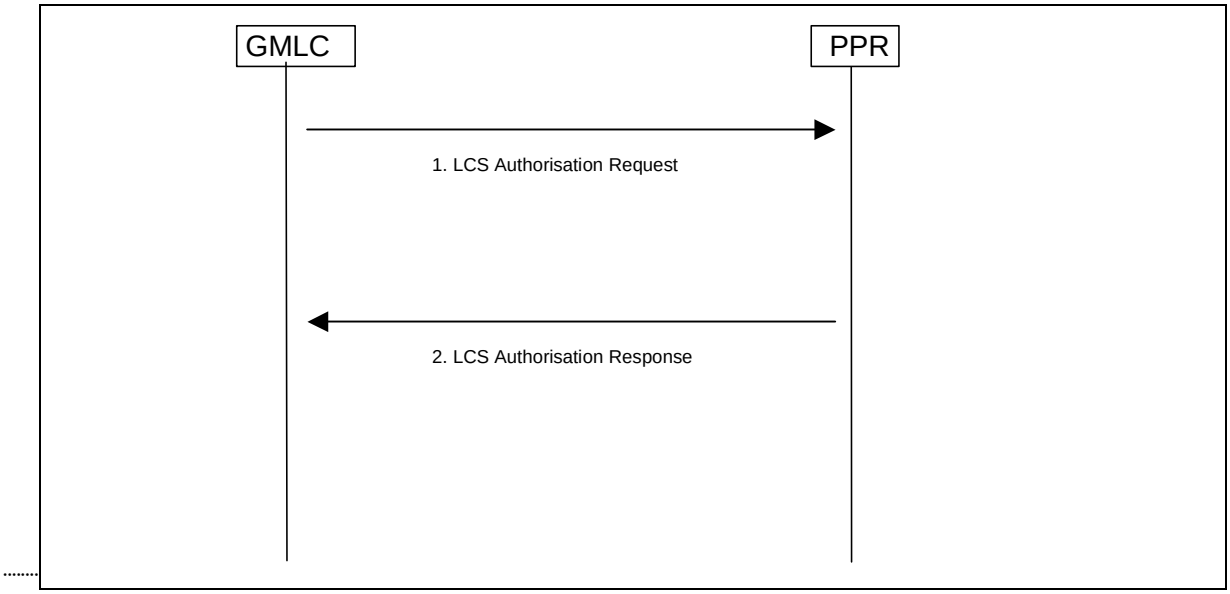

Figure 9.1B: LCS authorisation in PPR

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

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

2) If the LCS authorization request contains the pseudonym of the target UE, the PPR with PMD functionality seeks to determine the verinym of the target UE. PPR performs the privacy check based on the target UE's privacy profile. The result of that privacy check is sent to GMLC in the LCS Authorisation response. If the location request is to be barred, the PPR shall send an indication of this within the LCS Authorisation response and no other indicators. If requested by the GMLC the PPR shall include two privacy check results for the LCS Authorisation response, both call/session related and call/session unrelated privacy check results. The response may also contain information if an additional privacy check is needed when the GMLC has received the location information of the target UE (e.g. if the target UE allows its location information to be given to the LCS client only when it is located in certain areas).

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

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

<< End of changed clause >>

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Seoul, Korea, 15th – 19th Nov 2004

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CHANGE REQUEST

⌘ **23.271** **CR** **292** ⌘ **rev** **3** ⌘ Current version: **6.9.0** ⌘

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

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

Title:	⌘	Corrections to the Mobile Terminating Deferred Location request – UE available event
Source:	⌘	ZTE
Work item code:	⌘	LCS2
Date:	⌘	25/11/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	In deferred location service, when the SGSN/MSC receives an indication that the UE has moved to another SGSN/MSC, while it is waiting for the requested event to happen, SGSN/MSC shall immediately send a Subscriber Location Report request to the V-GMLC, which forwards it to the H-GMLC. The report shall include the address of the new SGSN/MSC. If the H-GMLC does not send SRI to HSS to get the new V-GMLC associated with the new SGSN/MSC, the H-GMLC shall send a new PSL to the old V-GMLC. Because the new SGSN/MSC may associate with a new V-GMLC, the old V-GMLC may has no association to the new SGSN/MSC. In this case the location service request shall be rejected in the V-GMLC. So I suggest some changes will be done to solve this case.
Summary of change:	⌘	Modify section 9.1.8.2. When the V-GMLC receive the Subscriber Location Report request including the new MSC/SGSN, it shall examine whether it is associated with the new MSC/SGSN. If so, it re-issues the location request to the new MSC/SGSN. Otherwise the V-GMLC forwards the responses to the H-GMLC. If the H-GMLC cannot determine the address of the new V-GMLC by itself, it shall then issue a SEND_ROUTING_INFO_FOR_LCS message to get the address of the V-GMLC associated with the new SGSN/MSC and reinitiate the MT-LR with the new SGSN/MSC through the new V-GMLC.
Consequences if not approved:	⌘	In deferred location service, when the UE has move to another SGSN/MSC, the location request may be rejected in the the new SGSN/MSC.

Clauses affected:	⌘	9.1.8.2

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

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

<< First changed clause >>

9.1.8.2 Location Report Procedure

8) Immediately following step 3, the SGSN/MSC shall verify if the requested event is already satisfied (e.g. UE available inferred from a current transaction) or can be invoked immediately (e.g. by paging the UE and receiving a page response). If the requested event is not already satisfied, the SGSN/MSC waits until it has occurred or until some maximum time has expired.

In case the SGSN/MSC receives an indication that the UE has moved to another SGSN/MSC, while it is waiting for the requested event to happen, SGSN/MSC shall immediately send a Subscriber Location Report to the V-GMLC~~, which forwards it to the H-GMLC~~. The report shall include the privacy related action, reference number and H-GMLC address that were included in the Provide Subscriber Location request and SGSN/MSC shall also include the address of the new SGSN/MSC, if available. ~~(H-GMLC shall in this case reinitiate the MT-LR with the new SGSN/MSC, see step 12.)~~ If the V-GMLC is associated with the new MSC/SGSN, it re-issues the location request to the new MSC/SGSN. Otherwise the V-GMLC forwards the responses to the H-GMLC. If the H-GMLC already knows (e.g. from a previous location request or an internal lookup table), or is able to determine, (e.g. it is possible to use a DNS lookup mechanism similar to IETF RFC 2916), the network address of the V-GMLC it reinitiates the MT-LR to the new SGSN/MSC of the new V-GMLC. Otherwise, the H-GMLC shall then issue a SEND_ROUTING_INFO_FOR_LCS message to get the address of the V-GMLC associated with the new SGSN/MSC and reinitiate the MT-LR with the new SGSN/MSC through the new V-GMLC, see step 12.

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

If either security or privacy check related actions fail, e.g. because the location information is not session or call related, the SGSN/MSC shall send a Subscriber Location Report with the reference number and H-GMLC address that was included in the Provide Subscriber Location with appropriate error cause indicating termination of the deferred location request.

10) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall include the reference number that was included in the Provide Subscriber Location, the H-GMLC address and an indication that this is a response to a previously sent deferred location request. The SGSN/MSC may record charging information.

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

11) V-GMLC sends the LCS Service Response to the H-GMLC with an indication of the event occurrence and the LDR reference number.

12) In case the LCS Service Response indicates to H-GMLC that the mobile has moved to another SGSN/MSC, the H-GMLC shall send the deferred MT-LR with UE available event to the V-GMLC (previous or new), which forwards the request to the new SGSN/MSC, as described in step 2 onwards.

13) The H-GMLC performs the privacy check as described in clause 9.1.1.

14) The H-GMLC sends the LCS Service Response to R-GMLC.

15) The R-GMLC sends the LCS Service Response to the LCS Client. When the R-GMLC returns the LCS Service Response to the LCS Client, the LDR reference number that was sent to the LCS Client in step 3 shall be included.

<< End of changed clause >>