

**Source:** TSG SA WG2  
**Title:** WI on Support of Location Services in UMTS Release 2000, System and Core Network aspects.  
**Agenda Item:** 6.2.3

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## Work Item Description

### Title

Support of Location Services in UMTS Release 2000, System and Core Network aspects.

### 1 3GPP Work Area

	Radio Access
X	Core Network
X	Services

### 2 Linked work items

*Support of Location Services in UTRA FDD*  
*Support of Location Services in UTRA TDD*  
*Support of Location Services in Packet Switched GERAN and circuit switched LCS enhancements*

### 3 Justification

LoCation Services (LCS) provide the mechanisms to support mobile location services for operators, subscribers and third party service providers. Currently in Release 99, LoCation Services (LCS) are supported only in the circuit switched domain (GMLC-MSC) of the core network.

This Work Item is needed in order to fulfill the requirements on supporting LCS in the packet switched domain and to enhance LCS with new service features in Release 2000.

### 4 Objective

LCS shall be supported in the circuit switched domain and in the packet switched domain. LCS shall be supported in the Access Networks UTRAN FDD, UTRAN TDD and GERAN.

The objective is to define signaling and interactions, protocol elements and operations for the Core Network, Access Network and User Equipment/MS from the system point of view to support location services with increased accuracy.

UMTS LCS and GSM LCS should be aligned and a well defined set of LCS specifications should be developed for Release 2000.

The overall R00 time schedule is being revised in S2 and the dependencies between different groups is taken in account. The detailed LCS time plan will be documented in the overall R00 Project Plan.

Task	Planned Start	Planned Finish
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Work Item Creation	4/2000	5/2000
Work Item Approval		6/2000
Drafting and discussion, updates of specifications		[TBD]
Submission to TSG CN and SA for approval		[TBD]
Possible remaining corrections and clarifications		[TBD]

## 5 Service Aspects

New LCS service features shall be evaluated and included in the Service description specification (Stage 1) as seen feasible. The service description should be common for all Access Networks. Possible new LCS service features identified so far are:

*- Call related location services in the packet switched domain*

*- Defined geographical areas*

Defined Geographical Areas (DEGA) may be used for example to identify and report when the user's terminal enters or leaves a defined geographical area. Also certain services or service features might be available or applicable to mobiles within specified geographical areas. It should be possible to request location information and possibly identities of all mobiles within the defined geographical area.

*- LCS quality level request*

LCS Clients should be able to indicate the wanted level of LCS quality in the LSC request.

*- Periodic LCS request*

The current service description on periodic LCS request should be verified and corresponding functionality included in stage 2 and stage 3 specifications.

*- Event based LCS request*

An internal LCS client may initiate an LCS request based on e.g. call events, handovers.

*- External LCS client identity in the PS domain*

*- Possible enhancements in the Open Service Architecture and Application Programming Interface support for location services*

## 6 MMI-Aspects

The Target UE might indicate to the user that it is entering, currently within, or leaving a defined geographical area. This service feature is FFS. The actual indication need not be standardized.

## 7 Charging Aspects

Tariffing dependent on location could be one possible application of the "Defined geographical area". This is FFS.

## 8 Security Aspects

LCS in the R00 network configuration must not compromise any security aspects.

It should be evaluated if the privacy options could be identified for MT-LR and possibly NI-LR and be different for different LCS Clients.

## 9 Impacts

<b>Affects:</b>	<b>USIM</b>	<b>ME</b>	<b>AN</b>	<b>CN</b>	<b>Others</b>
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<b>Yes</b>	X	X	X	X	
<b>No</b>					
<b>Don't know</b>					

### 10 Expected Output and Time scale (to be updated at each plenary)

GSM and 3GPP specifications that contain or may contain Location services related issues in Release 1999 and Release 2000 are listed in Annex 1. The table below contains selected samples.

<b>New specifications</b>						
Specification No.	Title	Prime resp. WG	2ndary resp. WG(s)	Presented for information at plenary#	Approved at plenary#	Comments
23.xxx	Functional stage 2 description of location services in UMTS and GSM, system and core network aspects	S2				This specification is common to GSM and UMTS
??.???	LCS support in GERAN	SMG2				
<b>Affected existing specifications</b>						
Specification No.	CR	Subject		Approved at plenary#		Comments
		<b>[All LCS related specifications are not yet listed here, see annex 1.]</b>				
22.071		Services and System Aspects; Location Services (LCS); Service description, Stage 1		SA#6		
GSM 03.71		Digital cellular telecommunications system (Phase 2+); Location Services (LCS); (Functional description) – Stage 2”		SMG#31bis		03.71 System parts to be combined with 23.171. 03.71 radio parts to become a new specification.
23.171		Services and System Aspects; Functional stage 2 description of location services in UMTS		SA#7		23.171 information to be included in 23.xxx
24.008		Mobile Radio Interface Layer 3 Specification				
29.002		Mobile Application Part (MAP)				
25.305		Stage 2 Functional Specification of Location Services in UTRAN		RAN #9		
25.413		UTRAN Iu interface RANAP signalling		RAN#9		
22.057		Mobile Station Application Execution Environment (MeXE); Service description, Stage 1				
23.057		MeXE Stage 2				
22.078		CAMEL Stage 1				
23.078		CAMEL Stage 2				
29.078		CAMEL Stage3				
22.121		VHE Service aspects (User location)				
23.127		OSA/VHE Stage 2				
29.198		OSA; Application Programming Interface; Part 1				
29.998		OSA; Application Programming Interface; Part 2				

Nokia's rapporteur candidate is Jan Kall.

**12 Work item leadership**

TSG SA WG 2.

**13 Supporting Companies**

Nokia, NTT DoCOMo, Ericsson, Fujitsu, Elisa Communications, Siemens, Lucent, Nortel

**14 Classification of the WI (if known)**

	Feature (go to 14a)
X	Building Block (go to 14b)
	Work Task (go to 14c)

14b The WI covers several Building Blocks: List of Work Tasks under these Building Blocks

<b>Building block</b>	<b>WG: work task expected completion date</b>
<b>Service description (Stage 1 development in S1)</b>	<b>S1</b> Evaluate and describe new LCS service features in R00: <i>July</i> - DEfined Geographical Areas, including location of all UE in area? - LCS QoS level request? - Periodic LCS request? - Event based LCS request? - External LCS client identity? - Privacy options when PDP-context and when no PDP-context is established?
<b>Overall system aspects of LCS</b>	<b>S2</b> Agree Work Item on LCS system and core network aspects <i>May</i>
	<b>S2</b> Define the combined GSM+UMTS LCS system architecture in R00, <i>Sept</i>
<b>Specify LCS Stage 2 for R00,</b>	<b>S2</b> include adopted new LCS service features in stage 2, <i>Sept</i>
	<b>S2</b> LCS system signaling procedures UMTS and GSM, protocol modifications and additions, <i>Sept</i>
	<b>S2</b> Call related LCS in the PS Domain, <i>Sept</i>
	<b>S2</b> Exception procedures in the Core Network, <i>Sept.</i>
	<b>CN WGs</b> Exception procedures, corresponding Stage 3 specifications, <i>Dec.</i>
<b>LCS support in the core network CS domain</b>	<b>N4</b> Impact of R00 architecture e.g. on MAP signalling for LCS
<b>LCS support in the core network PS domain (in R00 architecture)</b>	<b>N1</b> Layer 3 LCS signalling UE (MS) – SGSN (UMTS PS and GSM-GPRS)
	<b>N4</b> MAP signalling for LCS

<b>LCS interoperation aspects</b>	<b>S2 and SMG2</b> Co-ordinated development of GSM LCS Phase 2 and UMTS LCS
	<b>S2; SMG2; SMG12</b> Common LCS System and CN stage 2 specification, combine 23.171 & 03.71 add LCS in GPRS and PS domain <i>Sept.</i>
	[Separate GERAN LCS stage 2 specification based on radio parts of 03.71, SMG2]
	[Corresponding Stage 3 GSM specifications]
<b>LCS application interfaces (LCS-OSA) (Related to service platforms)</b>	<b>S1</b> (LCS-OSA) Service description <i>July</i>
	<b>S2</b> Corresponding LCS-OSA stage 2 specification, 23.171 <i>Sept.</i>
	Possible enhancements in MExE support for LCS?: <b>S1</b> Impacts on 22.057 <b>T2</b> Impacts on 23.057
	<b>N2</b> Possible enhancements in CAMEL Phase 4 for LCS?: <b>S1</b> Impacts on 22.078 <b>N2</b> Impacts on 23.078 & 29.078
	<b>N5</b> Possible enhancements in OSA support for LCS?, impacts on 23.127, 29.198 & 29.998
<b>Universal Geographic Area Description (GAD)</b>	<b>S2</b> Possible update of 23.032, e.g. text based presentation of LCS information <i>Sept.</i>

## Annex 1

## LCS Specifications and Reports in Release 1999 and possibly in Release 2000

Number	Title	LCS R99	LCS R00			WG
<b>GSM</b>	<b>LCS specifications</b>					
01.04	Abbreviations	01.04				
02.07	MS Features	02.07				
02.71	Location Services (LCS); Service description, Stage 1	22.071				
03.02	Architecture	23.002				
03.03	Numbering	23.003				
03.07	Restoration procedures	23.007				
03.08	Organization of subscriber data	23.008				
03.16	Subscriber data management	23.016				
03.30	Radio Network Planning Aspects	03.30				
03.32	Universal Geographic Area Description	23.032				
03.41	Short Message Service Call Broadcast	23.041				
03.71	Location Services (LCS); (Functional description) – Stage 2	03.71				
04.05	Data Link (DL) Layer General Aspects	04.05				
04.06	MS-BSS Interface Data Link(DL) Layer Specification	04.06				
04.07	Layer 3 General Aspects	24.007				
04.08	Mobile radio i/f (Layer 3)	04.18 23.108 24.008				
04.30	Mobile radio interface layer 3 supplementary services specification; Mobile Originating Location Request (MO-LR)	24.030				
04.31	Mobile Station (MS) - Serving Mobile Location Centre (SMLC); Radio Resource LCS Protocol (RRLP)	04.31				
04.35	Broadcast Network Assistance for Enhanced Observed Time Difference (E-OTD) and Global Positioning System (GPS) Positioning Methods	04.35				
04.71	Mobile radio interface layer 3 location services specification	04.71				
04.80	Supplementary Services	24.080				
05.02	Multiplexing (air i/f)	05.02				
05.05	Mobile radio i/f (Layer 3) Needed: Sensitivity constraints (E- OTD)	05.05				
05.10	Radio Subsystem Synchronization	05.10				
05.50	Background for RF requirements	05.50				
08.08	A i/f , MSC-BSS interface; Layer 3, Needed: BSC-BSC messaging	08.08				
08.31	Serving Mobile Location Centre (SMLC) – Serving Mobile Location Center (SMLC); SMLC Peer Protocol (SMLCPP)	08.31				
08.58	BSC-BTS interface (A bis i/f) Layer 3 Specification	08.58				
08.71	SMLC –BSS interface Layer 3 specification	08.71				
09.02	MAP	29.002				
09.08	BSSAP (E i/f)	09.08				
09.31	Base Station System Application Part LCS Extension (BSSAP- LE)	09.31				
12.71	?	32.071 ??				
<b>3GPP</b>	<b>Specifications in release 99 that may contain LCS issues</b>					

Number	Title	LCS R99	LCS R00			WG
	<b>in R00</b>					
21.111	USIM and IC card requirements					T3
21.904	UE Capability Requirements (UCR)					T2
21.905	3G Vocabulary					S1
22.030	Man-Machine Interface (MMI) of the Mobile Station (MS)					S1
22.038	SIM application toolkit (SAT); Stage 1					S1
22.042	Network Identity and Time Zone (NITZ), stage 1					S1
22.043	Support of Localised Service Area (SoLSA) - Stage 1					S1
22.057	Mobile Station Application Execution Environment (MExE); Stage 1					S1
<b>22.060</b>	<b>General Packet Radio Service (GPRS); Stage 1</b>	Yes				S1
<b>22.071</b>	<b>Location Services (LCS); Stage 1 (T1P1)</b>	Yes	changes			S1
22.078	CAMEL; Stage 1					S1
22.079	Support of Optimal Routing; Stage 1		LCS?			S1
<b>22.100</b>	<b>UMTS Phase 1</b>	Yes	no change			S1
<b>22.101</b>	<b>UMTS Service principles</b>	Yes	no change			S1
<b>22.105</b>	<b>Services &amp; Service capabilities</b>	yes	no change			S1
22.115	Service Aspects Charging and billing		LCS ?			S1
22.121	Provision of Services in UMTS - The Virtual Home Environment					S1
<b>23.002</b>	<b>Network Architecture</b>	LCS	changes			S2
<b>23.003</b>	<b>Numbering, Addressing and Identification</b>	LCS	changes?			N2B
<b>23.007</b>	<b>Restoration procedures</b>	LCS	changes?			N2B
<b>23.008</b>	<b>Organisation of subscriber data</b>	LCS	changes?			N2B
<b>23.016</b>	<b>Subscriber data management – Stage 2</b>	LCS				N2B
<b>23.032</b>	<b>Universal Geographical Area Description (GAD)</b>	LCS	change?			S2
23.041	Technical Realization of Cell Broadcast Service		LCS?			T2
<b>23.057</b>	<b>Mobile Station Application Execution Environment (MExE)</b>	LCS	?			T2
<b>23.060</b>	<b>General Packet Radio Service (GPRS) Service description; Stage 2</b>	LCS	?			S2
23.073	Support of Localised Service Area (SoLSA) - Stage 2					NSS
23.078	CAMEL Stage 2					N2A
23.079	Support of Optimal Routeing - Phase 1 - Stage 2		?			N2B
23.101	General UMTS Architecture		?			S2
23.107	Quality of Service, Concept and Architecture		?			S2
23.108	Mobile Radio Interface Layer 3 specification Core Network Protocols stage 2 (structured procedures)		?			N1
23.110	UMTS Access Stratum Services and Functions		?			S2
23.122	Non Access Stratum functions related to Mobile Station (MS) in idle mode		?			N1
23.127	Virtual Home Environment / Open Service Architecture					S2
<b>23.171</b>	<b>Functional stage 2 description of location services in UMTS</b>	LCS	changes			S2
<b>23.922</b>	<b>Architecture for an All IP network</b>	LCS	add LCS			S2
<b>23.930</b>	<b>Iu Principles</b>	LCS	changes?			S2
<b>24.007</b>	<b>Mobile Radio Interface Signalling Layer 3 - General Aspects</b>	LCS	changes?			N1
<b>24.008</b>	<b>Mobile Radio Interface Layer 3 specification; Core Network Protocols - Stage 3</b>	LCS	changes?			N1
<b>24.030</b>	<b>Location Services LCS Stage 3 SS (MO-LR)</b>	LCS	changes?			CN / SMG 03
24.067	Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) – Stage 3					NSS
24.072	Call Deflection Supplementary Service - Stage 3					NSS

Number	Title	LCS R99	LCS R00			WG
<b>24.080</b>	<b>Mobile radio Layer 3 Supplementary Service specification - Formats and coding</b>	LCS	changes?			NSS
25.123	Requirements for support of radio resource management (TDD)		?			R4
25.133	Requirements for support of radio resource management (FDD)		?			R4
25.141	Base station conformance testing (FDD)					R4
25.142	Base station conformance testing (TDD)					R4
25.201	Physical layer -General Description		?			R1
<b>25.215</b>	<b>Physical layer; Measurements (FDD)</b>	LCS	changes?			R1
<b>25.225</b>	<b>Physical layer; Measurements (TDD)</b>	no	changes			R1
25.301	Radio Interface Protocol Architecture		?			R2
25.302	Services provided by the physical layer		?			R2
25.303	UE functions and inter-layer procedures in connected mode		?			R2
25.304	UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode		?			R2
<b>25.305</b>	<b>Stage 2 Functional Specification of Location Services in UTRAN (LCS)</b>	LCS	changes			R2
25.324	Radio Interface for Broadcast/Multicast Services		?			R2
<b>25.331</b>	<b>Radio Resource Control (RRC) Protocol Specification</b>	LCS	changes?			R2
<b>25.413</b>	<b>UTRAN Iu interface RANAP signalling</b>	LCS	changes?			R3
<b>25.423</b>	<b>UTRAN Iur interface RNSAP signalling</b>	not yet?	changes?			R3
<b>25.433</b>	<b>UTRAN Iub interface NBAP signalling</b>	not yet?	changes?			R3
27.060	GPRS Mobile Stations supporting GPRS					N3
<b>29.002</b>	<b>Mobile Application Part (MAP)</b>	LCS	changes			N2B
<b>29.198</b>	<b>Open Services Architecture API part 1</b>	LCS	changes?			CN
<b>29.998</b>	<b>Open Services Architecture API part 2</b>	LCS	changes?			CN
<b>31.111</b>	<b>USIM Application Toolkit (USAT)</b>	LCS?	?			T3
<b>32.008</b>	<b>Subscriber and Equipment trace</b>	no LCS?	lcs?			S5
<b>32.102</b>	<b>3G Telecom Management Architecture</b>	LCS?	GMLC?			S5
<b>32.106</b>	<b>3G Configuration Management</b>	LCS?	GMLC?			S5
<b>32.111</b>	<b>3G Fault Management</b>	LCS?	GMLC?			S5
33.102	Security Architecture					S3
<b>33.120</b>	<b>Security Objectives and Principles</b>	LCS?	?			S3
<b>33.900</b>	<b>Guide to 3G security</b>	LCS?	?			S3
<b>34.121</b>	<b>Terminal Conformance Specification, Radio Transmission and Reception (FDD)</b>		LCS?			T1
<b>34.122</b>	<b>Terminal Conformance Specification, Radio Transmission and Reception (TDD)</b>		LCS?			T1
<b>34.123-1</b>	<b>UE Conformance Specification, Part 1 – Conformance specification</b>		LCS?			T1
<b>34.123-2</b>	<b>UE Conformance Specification, Part 2 – ICS</b>		LCS?			T1
<b>34.123-3</b>	<b>UE Conformance Specification, Part 3 – Abstract Test suites</b>		LCS?			T1