Source: **TSG S1**

Title: **Collection of CRs to 22.071**

Document for: **Approval**

Agenda Item: **5.1.3**

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3G CHANGE REQUEST

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22.071 **CR** **002**   Current Version: **3.0.0**

3G specification number ↑   *↑ CR number as allocated by 3G support team*

For submission to TSG **SA#5**   for approval **X**   *(only one box should be marked with an X)*
list TSG meeting no. here ↑   for information ☐

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Form: 3G CR cover sheet, version 1.0   *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: USIM **X**   ME **X**   UTRAN **X**   Core Network **X**
(at least one should be marked with an X)

Source:	S1

Date:

Subject:	UMTS LCS service requirements

3G Work item:	3TS/SA-0122071

Category: F Correction ☐
  A Corresponds to a correction in a 2G specification ☐
(only one category B Addition of feature **X**
shall be marked C Functional modification of feature ☐
with an X) D Editorial modification ☐

Reason for change:	This CR introduces LCS service requirements identified previously for UMTS in other 3GPP specifications.

Clauses affected:

Other specs affected:	Other 3G core specifications	☐	→ List of CRs:	
	Other 2G core specifications	☐	→ List of CRs:	
	MS test specifications	☐	→ List of CRs:	
	BSS test specifications	☐	→ List of CRs:	
	O&M specifications	☐	→ List of CRs:	

Other comments:

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1　　Scope

The present document provides the Stage One description of Location Services (LCS) on Global System for Mobile communications (GSM) networks. A Stage One description provides an overall service description, primarily from the service subscriber's and user's points of view, but not dealing with the details of the Man Machine Interface (MMI). This GTS includes information applicable to network operators, service providers and terminal, base station system, switch and data base manufacturers.

> NOTE:　Location Services may be considered as a network provided enabling technology consisting of standardized service capabilities which enables the provision of location applications. This application may be service provider specific. The description of the numerous and varied possible location applications which are enabled by this technology are outside the scope of this specification. However, clarifying examples of how the functionality being specified may be used to provide specific location services is included in various sections of the specification.

The present document contains the core requirements for the LCS on GSM to an extent sufficient to derive a complete definition of the LCS at the service level. However, the present document also documents some additional requirements which may suggest in a non-normative manner certain ways the system may be implemented to support the LCS feature.

LCS can be offered without subscription to basic telecommunication services. LCS is available to the following categories of LCS clients:

Value Added Services LCS Clients – use LCS to support various value added services. These clients can include GSM MS subscribers as well as non-subscribers to other GSM services.

PLMN Operator LCS Clients – use LCS to enhance or support certain O&M related tasks, supplementary services, IN related services and GSM bearer services and teleservices.

Emergency Services LCS Clients – use LCS to enhance support for emergency calls from GSM subscribers.

Lawful Intercept LCS Clients – use LCS to support various legally required or sanctioned services.

LCS is applicable to any target MS whether or not the MS supports LCS, but with restrictions on choice of positioning method or notification of a location request to the MS user when LCS or individual positioning methods, respectively, are not supported by the MS.

> NOTE:　　　It is envisioned that the specification of Location Services will be accomplished in a series of phased releases. These phases are described in GSM 10.71 [2]

LCS will be developed in phases. Phase 1 includes provision of the following:

> LCS Phase 1.　　This is the initial default phase of LCS. It provides a generic flexible architecture capable of supporting all positioning methods. Specific support is provided for Time Of Arrival (TOA) based positioning methods. Support is provided for emergency services, value added services and PLMN operator services.

Chapter 9 specifies requirements for further LCS phases.

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.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

2.1   Normative references

[1]   GSM 01.04 (ETR 350): "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2]   GSM 10.71: "Digital cellular telecommunications system (Phase 2+); Project scheduling and open issues; Location services (LCS)"

[3]   TS 23.032: "Universal Geographical Area Description"

[4]   TS 22.101: "Service principles"

[5]   TS 22.105: "Services and Service Capabilities"

[6]   TS 22.115: "Charging and Billing"

[7]   TS 22.121: "Virtual Home Environment"

[8]   TS 23.110: " UMTS Access Stratum; Services and Functions"

2.2   Informative references

[9]   TR 25.923: "Report on Location Services (LCS)"

[10]   PD 30.lcs: "Project Plan for location services in UMTS"

[11]   Third generation (3G) mobile communication system; Technical study report on the location services and technologies, ARIB ST9 December 1998.

[12]   The North American Interest Group of the GSM MoU ASSOCIATION: Location Based Services, Service Requirements Document of the Services Working Group

4   Functional Requirements

3GPP standards shall support location service features, to allow new and innovative location based services to be developed. It shall be possible to identify and report in a standard format (e.g. geographical co-ordinates) the current location of the user's terminal and to make the information available to the user, ME, network operator, service provider, value added service providers and for PLMN internal operations.

The location identification is provided to identify the likely location of specific MEs. This is meant to be used for charging, location-based services, lawful interception, emergency calls, etc., as well as the positioning services.

The standard shall support both GSM BSS and UTRAN to facilitate determination of the location of a mobile station.

NOTE: UTRAN will include support for LCS at Rel 1999, however full system support for LCS with UTRAN will be a part of release 2000.

5.3.1   LCS Client / LCS Server Interface

The LCS client/server use LCS messages to exchange information. Each LCS message contains a set of parameters.

NOTE: Further regional/national specific interfaces between LCS clients and servers may need to be supported in addition to the interfaces described here.

5.3.2.1 Location Service Request

Using the Location Service Request, an LCS client communicates with the LCS server to request the location information for one or more target MSs within a specified set of quality of service parameters.

LCS Phase 1 supports an immediate Request Type which provides a single response.

For Emergency Services, LCS shall support requests for the initial, the current (updated), or the last known position of an ME while a voice connection is established.

5.3.2.1 Location Service Response

The Location Service Response provides the result of an immediate Location Service Request from the LCS Server to the LCS Client.

5.4 Location information

5.4.1 Sources of location information

It shall be possible for the location determining process to make use of several sources of information in determining the location. Propagation and deployment conditions may limit the number or quality of measurements or additional measurements may be possible. Some ME may also have additional (independent) sources of position information. The LCS shall be capable of making use of the restricted or the extra information as appropriate for the service being requested.

9 Cross Phase Compatibility for R99

This section details the cross phase compatibility requirements relating to the service requirements in this document.

Note: when a change is introduced which affects the 3GPP specifications, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.

9.1 Compatibility With Existing Standards

Where the service and operational requirements in this document relate to a core network functionality, compatibility is required.

UTRAN LCS mechanisms shall be developed to maximise synergies with LCS earlier phases and shall hence support LCS Phase 2 enhancements.

9.2 Compatibility With Future Releases

It is envisaged that 3GPP standards will evolve beyond R99, for example with the addition of new service requirements. The standards which define the technical implementation of R99 should be developed in such a way that it is practical to add the requirements in this section in a backward compatible manner.

Following chapters include requirements that are foreseen for future release.

9.2.1 UTRAN support

UTRAN shall support, or at least be prepared for, important location services features in 3GPP Release 99. The measurement method(s) concluded to be feasible for UTRAN shall be selected and standardized in 3GPP Release 99. It shall be possible to enable the introduction of more positioning methods later, with minimum impact on systems in operation.

It shall be possible for the location service to be used by the majority of ME within the UTRAN area without compromising the radio transmission or the signalling capabilities of the radio system. The location service is not an occasional "emergency only" service.

It shall be possible for the location service to be used by both "active" ME and by "idle" ME.

9.2.2 Location identification in UTRAN and/or ME

When location identification is supported by UTRAN, the following apply,

1) UTRAN obtains 'Area ID' and/or geographic co-ordinates with uncertainty parameters for identification of the likely location of ME, to be sent to the NAS entity side of the CN (i.e., edge node) 'Area ID' represents either a radio access cell/sector or a geographic area. 'Area ID' is coded in the same format as Cell Global Identification (CGI).

2) It shall be possible to report the [estimated achieved] accuracy level of the location report as a resolution that will be limited by the accuracy capability of the local serving UTRAN and the capability of the ME. Note that certain effects, such as multipath propagation, may lead to one-sided errors and thus a non-circular location error zone is likely.

3) Location information is always at least obtained from UTRAN by the appropriate edge node(s) at the activation of a Call/PDP Context. A mechanism to make it possible to obtain the location information at the release of a Call/PDP Context should be specified. Location information sent to the edge node at other occasions is on the basis of asynchronous requests from the edge node to UTRAN. An edge node can request UTRAN to send the location

information with the two types of requests, Type 1 (Direct request) where UTRAN sends location information only once at the request and Type 2 (Event request) where UTRAN sends location information at each specified event (e.g. Cell Update) requested by the edge node.

9.2.3   Quality level negotiation

It shall be possible for the LCS Client to specify or negotiate a (minimum) level of quality, such as accuracy, in a ME location information request. Different applications demand different levels of positioning accuracy and other positioning performance parameters, so the levels of performance should be classified according to the type of applications. The quality of location information can involve parameters like accuracy, update frequency, time stamp, time-to-first-fix, reliability, continuity, etc in a feasible way. The quality of the generated location information can exceed the required level. In case location information is not available to the required quality level , the request can either be denied and the service execution terminated, or the user accepts the lower quality information. The quality level requirement of each service (application) could be set both by the subscriber and the service provider.

It shall be possible to select the repetition rate of the location information update. The reports may be distributed to different clients at different rates.

9.2.4   Defined geographical areas

It shall be possible to specify a geographical area as ellipse to a resolution that will be limited by the accuracy capability of the part of the serving network where the user is registered.

It may be possible to identify and report when the user's terminal enters or leaves a specified geographic area.

In order to enable ME to determine itself if it enters or leaves a defined geographical area information about the defined geographical area shall be made available to client. The method is FFS, one alternative is that cells covering parts of the geographical area broadcasts information about the geographical area.

9.2.5   Continuous check of location

The client may continuously check its current location with or without requesting signalling support from the network using the Self Location feature. In this way the client may become aware of entering or leaving a predefined geographical area, as defined above, and/ or it can supply the user or an application with real-time tracking information.

9.2.6   Identification of a Target MS

In future releases support usage of IP addresses for MS identification shall be supported by the standard.

9.2.7   PS Services

LCS shall support location services for packet switched services in future releases.

9.2.8   VHE

LCS shall support VHE 22.121 [7]. Specifically negotiation of parameters shall be done using VHE service capability features.

3G CHANGE REQUEST

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22.071	CR	003	Current Version:	3.0.0

3G specification number ↑   *↑ CR number as allocated by 3G support team*

For submission to TSG   SA#5   for approval   **X**   *(only one box should*
list TSG meeting no. here ↑   for information   *be marked with an X)*

Form: 3G CR cover sheet, version 1.0   The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM [ ]   ME **X**   UTRAN **X**   Core Network **X**
(at least one should be marked with an X)

Source:	Nokia	**Date:**	

Subject:	LCS accuracy requirements

3G Work item:	LCS

Category: F Correction   [ ]
A Corresponds to a correction in a 2G specification   [ ]
(only one category   B Addition of feature   [ ]
shall be marked   C Functional modification of feature   **X**
with an X)   D Editorial modification   [ ]

Reason for change:	This CR includes LCS service requirements for accuracy.

Clauses affected:	

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:	
Other 2G core specifications	[ ]	→ List of CRs:	
MS test specifications	[ ]	→ List of CRs:	
BSS test specifications	[ ]	→ List of CRs:	
O&M specifications	[ ]	→ List of CRs:	

Other comments:	

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4.1 Quality of Service

4.1.1 Horizontal Accuracy

For Value Added Services and PLMN Operator Services, the following is applicable:

Accuracy is application driven and is one of the negotiable Quality of Service (QoS) parameters.

The precision of the location shall be network design dependent, i.e., should be an operator's choice. This precision requirement may vary from one part of a network to another.

The LCS shall allow an LCS Client to specify or negotiate the required horizontal accuracy. The LCS shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict.

The required location accuracy varies from 10m up to 1km, depending on applications. The location determining process may be able to combine several techniques to accommodate local conditions and evolving technology. The accuracy provided as a result of a given positioning attempt may vary depending on dynamically changing radio conditions and other factors.

For Emergency Services (where required by local regulatory requirements) the following requirements shall be met:

- The LCS Server shall attempt to obtain the horizontal location of the calling MS, in terms of universal latitude and longitude coordinates, and shall provide this to an Emergency Service Provider. The accuracy shall be defined by local regulatory requirements, for example, with an accuracy of within 125 meters for at least 67% of calls in the United States. To provide for more stringent emergency service requirements in other countries, the LCS Server may provide higher accuracy.

NOTE: The LCS Server provides the location service capabilities but the mechanism by which location is reported to an emergency service provider is outside the scope of this service.

4.1.2 Vertical Accuracy

For Value Added Services, and PLMN Operator Services, the following is applicable:

The LCS Server may provide the vertical location of an MS in terms of either absolute height/depth or relative height/depth to local ground level. The LCS Server shall allow a LCS Client to specify or negotiate the required vertical accuracy. The LCS Server shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict.

The vertical accuracy may range from a about ten metres (e.g. to resolve within 1 floor of a building) to hundreds of metres.