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Presentation of Technical Specification to TSG SA

Presentation to:	**TSG SA Meeting #21**
Document for presentation:	**TS 32.271, Version 1.0.0**
Presented for:	**Information**

Abstract of document:

Work done against WID contained in SP-030047 (Charging Management: Work Item ID:CH) and in SP-030050 (Charging Management for Service Charging Work Item ID: CH-SC), both approved at SA#19.

This TS on "Location Service (LCS) charging" specifies the LCS offline and online charging functions based on the LCS functional stage 2 description in TS 23.071. This TS includes the LCS-specific charging architecture and scenarios. It specifies the structure and content of the CDRs for offline charging as well as the charging events for online charging.

Changes since last presentation to TSG-SA:

- New

Outstanding Issues:

The content of the LCS CDRs and scenarios as well as the online LCS charging description are not complete yet. The expected completion date is 03/2004.

Contentious Issues:

- None.

3GPP TS 32.271 V1.0.0 (2003-09)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Service and System Aspects;
Telecommunication management;
Charging management;
Location Services (LCS) charging
(Release 6)

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

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  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document is part of a series of documents that specify charging functionality and charging management in GSM/UMTS networks. The GSM/UMTS core network charging architecture and principles are specified in 3GPP TS 32.240 [1], which provides an umbrella for other charging management documents that specify

- the content of the CDRs per domain and subsystem (offline charging);
- the content of real-time charging events per domain / subsystem (online charging);
- the functionality of online and offline charging for those domains and subsystems;
- the interfaces that are used in the charging framework to transfer the charging information (i.e. CDRs or charging events).

The complete document structure for these TSs is defined in 3GPP TS 32.240 [1].

The present document specifies the LCS Offline and Online Charging functions based on the functional stage 2 description of the LCS in 3GPP TS 23.071 [61]. This charging description includes the LCS specific charging architecture and scenarios. It specifies the structure and content of the CDRs for offline charging as well as the charging events for online charging. The parameters, abstract syntax and encoding rules for the LCS-CDR types used for LCS offline charging are specified in 3GPP TS 32.298 [41]. The 3GPP Diameter application that is used for LCS online charging is specified in 3GPP TS 32.299 [40]. The mechanisms used to transfer the CDRs from the generating service node (i.e. the GMLC) to the collecting node in the operator's billing domain (e.g. the billing system or a mediation device) are specified in 3GPP TS 32.297 [42]. A generic Diameter application for online charging in 3GPP networks is specified in 3GPP TS 32.299 [40].

The present document only covers the LCS charging functionality of GMLC. The LCS charging functionality in CS and PS domains are specified in 3GPP TS 32.250 [10] and 3GPP TS 32.251 [11] respectively.

All references, abbreviations, definitions, descriptions, principles and requirements, used in the present document, that are common across 3GPP TSs, are defined in 3GPP TR 21.905 [50]. Those that are common across charging management in GSM/UMTS domains or subsystems are provided in the umbrella document 3GPP TS 32.240 [1] and are copied into clause 3 of the present document for ease of reading. Finally, those items that are specific to the present document are defined exclusively in the present document.

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.*

a) The 3GPP charging specifications

[1] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[2]-[9] Void.

[10] 3GPP TS 32.250: "Telecommunication management; Charging management; Circuit Switched (CS) domain charging".

[11] 3GPP TS 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".

[12]-[39] Void.

[40] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".

[41] 3GPP TS 32.298: "Telecommunication management; Charging management; Charging Data Record (CDR) encoding rules description".

[42] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".

[43]-[49] Void.

b) Common 3GPP specifications

[50] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[51]-[59] Void.

c) other Domain and Service specific 3GPP / ETSI specifications

[60] 3GPP TS 22.071: "Location Services (LCS); Service description; Stage 1".

[61] 3GPP TS 23.271: "Location Services (LCS); Functional description; Stage 2".

[62] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[63] 3GPP TS 25.305: "User Equipment (UE) positioning in Universal Terrestrial Radio Access Network (UTRAN); Stage 2".

[64] 3GPP TS 43.059: "Functional stage 2 description of Location Services (LCS) in GERAN".

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

3 Definitions, abbreviations and symbols

3.1 Definitions

For the purposes of the present document, the terms and definitions defined in 3GPP TR 21.905 [50] and 3GPP TS 32.240 [1], and the following apply:

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 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.

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 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.

Positioning method (/locating method): method or technical solution, which is used to get an estimate of the target mobile's geographical location

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, 3GPP TS 25.305 [63] and GERAN Stage 2, 3GPP TS 43.059 [64].

target UE: UE being positioned

User Equipment (UE): term "User Equipment" or "UE", should for GSM be interpreted as "MS", as defined in GSM 04.02 [65]
UE in the present document may also refer to a Mobile Equipment or User Equipment used for emergency calls, that do not have valid SIM or USIM.

3.2 Abbreviations

For the purposes of the present document, the abbreviations defined in 3GPP TR 21.905 [50], 3GPP TS 23.271 [61] and 3GPP TS 32.240 [1], and the following apply:

3GPP	3rd Generation Partnership Project
BD	Billing Domain
CDGF	Charging Data Generation Function
CDR	Charging Data Records
CGF	Charging Gateway Function
CS	Circuit-Switched
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMLC	Gateway MLC
gsmSCF	GSM Service Control Function
H-GMLC	Home GMLC
HLR	Home Location Register
HPLMN	Home PLMN
HSS	Home Subscriber Server
IMSI	International Mobile Subscriber Identity
LCS	LoCation Service
MAP	Mobile Application Part
MO-LR	Mobile Originated - Location Request
MSISDN	Mobile Station Integrated Services Data Network
MT-LR	Mobile Terminated - Location Request
NI-LR	Network Induced - Location Request
PLMN	Public Land Mobile Network
PMD	Pseudonym Mediation Device functionality
PPR	Privacy Profile Register
PS	Packet Switched
RAN	Radio Access Network
R-GMLC	Requesting - GMLC
SGSN	Serving GPRS Support Node
TR	Technical Report
TS	Technical Specification
UE	User Equipment
UTRAN	Universal Terrestrial Radio Access Network
V-GMLC	Visited GMLC
VPLMN	Visited PLMN

3.3 Symbols

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

Bl	Reference point for the CDR file transfer for LCS to the BD, i.e. between the GMLC and the BD
Lr	Interface between Gateway MLCs

4 Architecture considerations

The architecture for LCS charging is the same as for the CS domain. The usage of the file based interface employed to transfer the LCS-CDR files from the CDR generating node to a post-processing system residing in the operator's billing domain are defined in 3GPP TS 32.297[42].

The GMLC has an integrated CDGF and CGF. Figure 4.1 shows the offline charging architecture mapping for LCS and other SN that incorporate a CDGF/CGF with the external Charging Gateway with CGF.

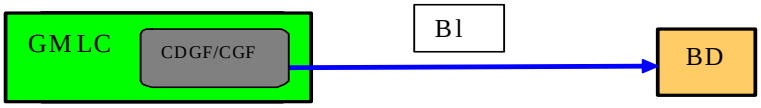

Figure 4.1: LCS charging architecture

Editor's note: add a statement that explains the difference between CS and PS Domain LCS charging architecture.

5 LCS charging principles and scenarios

Editor's note: Include a brief introduction statement saying that this clause contains the CDR and charging event types and their trigger conditions.

5.1 LCS charging principles

Charging information in the Service domain for LCS is collected for inter-operator charging purpose by the GMLC. The basic principle is that a network requesting location information may be charged by the network that provides the location information.

The GMLC shall collect the following charging information:

- Identity of the mobile subscriber to be located and of the entity requesting the location;
- Identity of the GMLC or PLMN serving the LCS Client;
- QoS Requested/Delivered: the charging information shall describe the quality of the location requested and delivered to the LCS client;
- Request Timestamp: the charging information shall record the date and time the location procedure was requested by the LCS client;
- Location services requested: the charging information shall describe the service types for which the LCS client is allowed to locate the particular UE;
- Usage of continuous/periodic tracking;
- Charging for Location Based Services (LBS): the charging information shall describe the service specific information in addition to the above location resource information.

5.2 LCS offline charging scenarios

This clause contains a number of example scenarios illustrating the purpose and practical usage of the various types of records defined in clause 5.7. These examples are by no means exhaustive.

For the purpose of these examples, the following assumptions have been made:

- that the RAN location procedures are not depicted;
- that the CS and PS location procedures are not distinguished.

5.2.1 Mobile originated location request

Mobile Originated location request allow the UE to obtain its own geographical location or have its location information transferred to another LCS client. In this procedure, the R-GMLC, H-GMLC and V-GMLC are the same as no privacy checking is performed.

Figure 5.1 illustrates a Mobile Originated Location Request that allows a UE to request its own location.

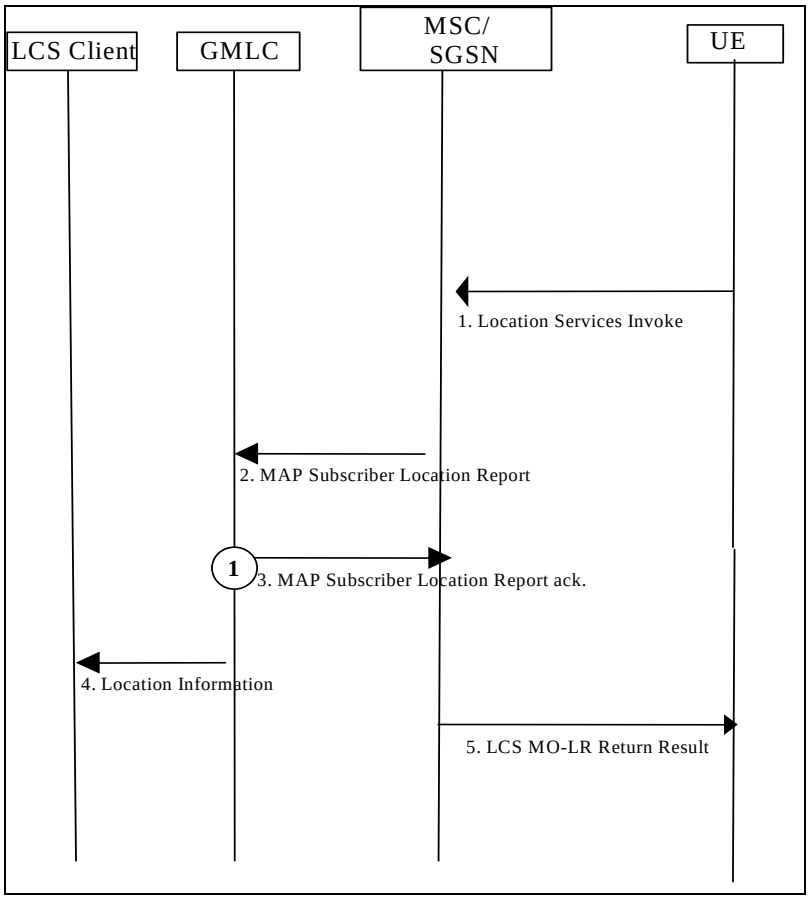

Figure 5.1: Record trigger overview for MO-LR

5.2.2 Mobile terminated location request

Editor's Note: Provide a short introduction that describes the MT-LR procedure and include the scenario description.

5.2.3 Network initiated location request

Editor's Note: Provide a short introduction that describes the MT-LR procedure and include the scenario description.

5.3 LCS online charging scenarios

Editor's note: TBD.

6 Definition of charging information

This clause provides Stage 3 specifications of the CDR type and content for LCS.

Editor's note: provide some additional introductory statement here.

6.1 Data description for LCS offline charging

Dedicated types of CDRs can be generated in the service domain for LCS by the GMLC. The content of each CDR type is defined in one of the tables that are part of this clause. For each CDR type the parameter definition includes the parameter name, description and category.

Equipment vendors shall be able to provide all of the parameters listed in the CDR content table in order to claim compliance with the present document. However, since CDR processing and transport consume network resources, operators may opt to eliminate some of the parameters that are not essential for their operation. This operator provisionable reduction is specified by the parameter category.

A parameter category can have one of two primary values:

M This parameter is **M**andatory and shall always be present in the CDR.

C This parameter shall be present in the CDR only when certain Conditions are met. These Conditions are specified as part of the parameter definition.

Some of these parameters are designated as Operator (**O**) provisionable. Using TMN management functions or specific tools provided by an equipment vendor, operators may choose, if they wish, to include or omit the parameter from the CDR. Once omitted, this parameter is not generated in a CDR. To avoid any potential ambiguity, a CDR generating element MUST be able to provide all these parameters. Only an operator can choose whether or not these parameters should be generated in its system.

Those parameters that the operator may configure to be present or absent are further qualified with the "Operator provisionable" indicator as follows:

Mo This is a parameter that, if provisioned by the operator to be present, shall always be included in the CDRs. In other words, an Mo parameter that is provisioned to be present is a mandatory parameter.

Co This is a parameter that, if provisioned by the operator to be present, shall be included in the CDRs when the required conditions are met. In other words, an Co parameter that is configured to be present is a conditional parameter.

The GMLC shall be able to provide the CDRs at the Billing System interface in the format and encoding described in the present document. Additional CDR formats and contents, generated by the GMLC, may be available at the interface to the billing system to meet the requirements of the billing system, these are outside of the scope of 3GPP standardization.

The following tables provide a brief description of each CDR parameter. Full definitions of the parameters, sorted by the parameter name in alphabetical order, are provided in 3GPP TS 32.298 [41].

6.1.1 LCS Records for Mobile Originated Location Request (LCS-GMO-CDR)

If enabled, a GMLC Mobile originated LCS Charging Data Record (LCS-GMO-CDR) shall be produced for each mobile originated location request performed via the GMLC. The fields in the record are specified in table 6.1. Table 6.1 provides a brief description of each field.

Table 6.1: GMLC Mobile Originated LCS CDR (LCS-GMO-CDR)

Field	Category	Description
Record Type	M	GMLC Mobile Originated LCS Record
Recording Entity	M	The E.164 address of this GMLC
LCS Client Type	C	The type of the LCS client that invoked the LR, if available.
LCS Client Identity	C	Further identification of the LCS client, if available.
Served IMSI	M	The IMSI of the subscriber that requests the location.
Served MSISDN	M_o	The primary MSISDN of the subscriber that requests the location.
Serving Entity	C	The E.164 address of the serving MSC (in case of CS-MO-LR) or SGSN (in case of PS-MT-LR)
Record Time Stamp	M_o	Time of generation of the CDR
Local Record Sequence Number	M_o	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Record extensions	C_o	A set of network/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Editor's note: The above table is not complete and should contain additional LCS information that are under discussion.

6.1.2 LCS Records for mobile terminated location request

6.1.2.1 LCS Records for Requesting GMLC (LCS-RGMT-CDR)

If enabled, a Requesting GMLC Mobile terminated LCS Charging Data Record (LCS-RGMT-CDR) shall be produced for each mobile a terminated location request is performed via the R-GMLC. The fields in the record are specified in table 6.2. Table 6.2 provides a brief description of each field.

Table 6.2: Requesting GMLC Mobile Terminated LCS CDR (LCS-RGMT-CDR)

Field	Category	Description
Record Type	M	Requesting GMLC Mobile Terminated LCS Record
Recording Entity	M	The E.164 address of this GMLC
LCS Client Type	C	The type of the LCS client that invoked the LR, if available.
LCS Client Identity	C	Further identification of the LCS client, if available.
Target IMSI	M	The IMSI of the targeted LCS subscriber
Target MSISDN	M_o	The primary MSISDN of the targeted subscriber.
Location Type	M	The type of location information being requested.
LCS Priority	C	Priority of the LR, if available
Record Time Stamp	M_o	Time of generation of the CDR
Local Record Sequence Number	M_o	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Record extensions	C_o	A set of network/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Editor's note: The above table is not complete and should contain additional LCS information that are under discussion.

6.1.2.2 LCS Records for Visited GMLC (LCS-VGMT-CDR)

If enabled, a Visited GMLC Mobile terminated LCS Charging Data Record (LCS-VGMT-CDR) shall be produced for each mobile a terminated location request is performed via the V-GMLC. The fields in the record are specified in table 6.3. Table 6.3 provides a brief description of each field.

Table 6.3: Visited GMLC Mobile Terminated LCS CDR (LCS-VGMT-CDR)

Field	Category	Description
Record Type	M	Visited GMLC Mobile Terminated Record
Recording Entity	M	The E.164 address of this GMLC
LCS Client Type	C	The type of the LCS client that invoked the LR, if available.
LCS Client Identity	C	Further identification of the LCS client, if available.
Target IMSI	M	The IMSI of the targeted LCS subscriber
Target MSISDN	M_o	The primary MSISDN of the targeted subscriber.
Location Type	M	The type of location information being requested.
LCS Priority	C	Priority of the LR, if available
Record Time Stamp	M_o	Time of generation of the CDR
Local Record Sequence Number	M_o	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Record extensions	C_o	A set of network/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Editor's note: The above table is not complete and should contain additional LCS information that are under discussion.

6.1.3 LCS Records for Network Initiated Location Request (LCS-GNI-CDR)

Editor's note: to de defined.

6.2 Data description for LCS online charging

Editor's Note: To be completed.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Sep 2003	S_21	SP-030411	--	--	Submitted to TSG SA#21 for Information	1.0.0	