ETSI TS 132 271 V7.1.0 (2009-01)

Technical Specification

Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Charging management;
Location Services (LCS) charging
(3GPP TS 32.271 version 7.1.0 Release 7)

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

Reference
RTS/TSGS-0532271v710

Keywords
GSM, UMTS

ETSI

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

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:

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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 description for the LCS domain, based on the functional stage 2 description of the LCS in 3GPP TS 23.071 [201]. This charging description includes the offline and online charging architecture and scenarios specific to the LCS, as well as the mapping of the common 3GPP architecture specified in TS 32.240 [1] onto the LCS domain. It further specifies the structure and content of the CDRs for offline charging and the charging events for online charging. The present document is related to other 3GPP charging TSs as follows:

- The common 3GPP charging architecture is specified in TS 32.240 [1];
- The parameters, abstract syntax and encoding rules for these CDR types are specified in TS 32.298 [51].
- A transaction based mechanism for the transfer of CDRs within the network is specified in TS 32.295 [54].
- The file based mechanism used to transfer the CDRs from the network to the operator"s billing domain (e.g. the billing system or a mediation device) is specified in TS 32.297 [52].
- The 3GPP Diameter application that is used for LCS domain offline and online charging is specified in TS 32.299 [50].

All terms, definitions and abbreviations, used in the present document, that are common across 3GPP TSs, are defined in 3GPP TR 21.905 [100]. Those that are common across charging management in GSM/UMTS domains, services, 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.

Furthermore, requirements that govern the charging work are specified in 3GPP TS 22.115 [102].

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.*

[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]-[19] Void.

[20] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[21]-[29] Void.

[30] 3GPP TS 32.270: "Telecommunication management; Charging management; Multimedia Messaging Service (MMS) charging".

[31]-[49] Void

[50] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".

[51] 3GPP TS 32.298: "Telecommunication management; Charging management; Charging Data Record (CDR) encoding rules description".

[52] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".

[53] 3GPP TS 32.296: "Telecommunication management; Charging management; Online Charging System (OCS) applications and interfaces".

[54] 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".

[55]-[99] Void.

[100] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[101]-[199] Void.

[200] Void.

[201] 3GPP TS 23.271: "Location Services (LCS); Functional description; Stage 2".

[202] Void.

[203] 3GPP TS 25.305: "User Equipment (UE) positioning in Universal Terrestrial Radio Access Network (UTRAN); Stage 2".

[204] 3GPP TS 43.059: "Functional stage 2 description of Location Services (LCS) in GERAN".

[206]-[299] Void.

[301]-[399] Void.

[400] Void.

[401] RFC 3588: "Diameter Base Protocol".

[402] IETF RFC 4006: "Diameter Credit Control Application".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions defined in 3GPP TR 21.905 [100] and 3GPP TS 32.240 [1], and the following apply:

accounting: process of apportioning charges between the Home Environment, Serving Network and Subscriber.

billing: function whereby CDRs generated by the charging function(s) are transformed into bills requiring payment.

Billing Domain: part of the operator network, which is outside the telecommunications network, that receives and processes CDR files from the network charging functions. It includes functions that can provide billing mediation and billing or other (e.g. statistical) end applications. It is only applicable to offline charging (see 'Online Charging System' for equivalent functionality in online charging).

CDR field categories: the CDR fields are defined in the present document. They are divided into the following categories:

- Mandatory (**M**): field that shall always be present in the CDR.
- Conditional (**C**): field that shall be present in a CDR if certain conditions are met.
- Operator Provisionable: Mandatory ($\mathbf{O_m}$): A field that operators have provisioned to always be included in the CDR.
- Operator Provisionable: Conditional ($\mathbf{O_c}$): A field that operators have provisioned to be included in the CDR if certain conditions are met.

chargeable event: activity utilizing telecommunications network resources and related services for:

- user to user communication (e.g. a single call, a data communication session or a short message); or
- user to network communication (e.g. service profile administration); or
- inter-network communication (e.g. transferring calls, signalling, or short messages); or
- mobility (e.g. roaming or inter-system handover); and
- that the network operator may want to charge for.

As a minimum, a chargeable event characterises the resource / service usage and indicates the identity of the involved end user(s).**charging:** a function within the telecommunications network and the associated OCS/BD components whereby information related to a chargeable event is collected, formatted, transferred and evaluated in order to make it possible to determine usage for which the charged party may be billed.

Charging Data Record (CDR): a formatted collection of information about a chargeable event (e.g. time of call set-up, duration of the call, amount of data transferred, etc) for use in billing and accounting. For each party to be charged for parts of or all charges of a chargeable event a separate CDR shall be generated, i.e. more than one CDR may be generated for a single chargeable event, e.g. because of its long duration, or because more than one charged party is to be charged.

charging event: a set of charging information forwarded by the CTF towards the CDF (offline charging) or towards the OCS (online charging). Each charging event matches exactly one chargeable event.

charging function: entity inside the network domain, subsystem or service that is involved in charging for that domain, subsystem or service.

circuit switched domain: domain within GSM / UMTS in which information is transferred in circuit switched mode.

credit control: Editor's note: FFS.

domain: part of a communication network that provides network resources using a certain bearer technology.

Fully Qualified Partial CDR (FQPC): partial CDR that contains a complete set of the fields specified in the present document. This includes all the mandatory and conditional fields as well as those fields that the PLMN operator has provisioned to be included in the CDR. The first Partial CDR shall be a Fully qualified Partial CDR.

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.

middle tier (charging) TS: used for the 3GPP charging TSs that specify the domain / subsystem / service specific, online and offline, charging functionality. These are all the TSs in the numbering range from 3GPP TS 32.250 to 3GPP TS 32.279, e.g. 3GPP TS 32.250 [10] for the CS domain, or 3GPP TS 32.270 [30] for the MMS service. Currently, there is only one "tier 1" TS in 3GPP, which is TS 32.240 [1] that specifies the charging architecture and principles. Finally, there are a number of top tier TSs in the 32.29x numbering range ([50] ff) that specify common charging aspects such as parameter definitions, encoding rules, the common billing domain interface or common charging applications.

offline charging: charging mechanism where charging information **does not** affect, in real-time, the service rendered.

online charging: charging mechanism where charging information can affect, in real-time, the service rendered and therefore a direct interaction of the charging mechanism with bearer/session/service control is required.

Online Charging System: Editor's note: FFS.

packet switched domain: domain within GSM / UMTS in which data is transferred in packet switched mode. Corresponds to the term "GPRS".

partial CDR: CDR that provides information on part of a subscriber session. A long session may be covered by several partial CDRs. Two formats are considered for Partial CDRs. One that contains all of the specified fields (FQPC); the second has a reduced format (RPC).

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 [203] and GERAN Stage 2, 3GPP TS 43.059 [204].

target UE: UE being positioned

user: an entity, not part of the 3GPP System, that uses network resources by means of a subscription. The user may or may not be identical to the subscriber holding that subscription.

User Equipment (UE): a device allowing a user access to network services. For the purpose of 3GPP specifications the interface between the UE and the network is the radio interface. A User Equipment can be subdivided into a number of domains, the domains being separated by reference points. Currently defined domains are the USIM and ME Domains. The ME Domain can further be subdivided into several components showing the connectivity between multiple

functional groups. These groups can be implemented in one or more hardware devices. An example of such a connectivity is the TE – MT interface. Further, an occurrence of a User Equipment is an MS for GSM as defined in GSM TS 04.02.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 Symbols

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

Bl	Reference point for the CDR file transfer from the GMLC CGF to the BD,
Lr	Interface between Gateway MLCs

3.3 Abbreviations

For the purposes of the present document, the abbreviations defined in 3GPP TR 21.905 [100], 3GPP TS 23.271 [20] and 3GPP TS 32.240 [1], and the following apply:

3G	3rd Generation
3GPP	3rd Generation Partnership Project
AVP	Attribute Value Pair
BD	Billing Domain
CCA	Credit Control Answer
CCR	Credit Control Request
CDF	Charging Data Function
CDR	Charging Data Records
CGF	Charging Gateway Function
CS	Circuit-Switched
CTF	Charging Trigger Function
DCCA	Diameter Credit Control Application
ECUR	Event Charging with Unit Reservation
FTAM	File Transfer, Access and Management
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMLC	Gateway MLC
GPRS	General Packet Radio Service
GSM	Global System for Mobile communication
gsmSCF	GSM Service Control Function
H-GMLC	Home GMLC
HLR	Home Location Register
HPLMN	Home PLMN
HSS	Home Subscriber Server
IEC	Immediate Event Charging
IETF	Internet Engineering Task Force
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ITU-T	International Telecommunication Union - Telecommunications standardization sector
LCS	LoCation Service
MAP	Mobile Application Part
ME	Mobile Equipment
MO	Mobile Originated
MO-LR	Mobile Originated - Location Request
MS	Mobile Station
MSISDN	Mobile Station Integrated Services Data Network
MT	Mobile Terminated
MT-LR	Mobile Terminated - Location Request
NI-LR	Network Induced - Location Request
OCS	Online Charging System
PLMN	Public Land Mobile Network
PMD	Pseudonym Mediation Device functionality