ETSI TS 132 295 V16.0.0 (2020-08)

Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Charging management;
Charging Data Record (CDR) transfer
(3GPP TS 32.295 version 16.0.0 Release 16)

Reference
RTS/TSGS-0532295vg00

Keywords
GSM,LTE,UMTS

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Foreword

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

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1 Scope

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

- the content of the CDRs per domain / subsystem / service (offline charging);
- the content of real-time charging messages per domain / subsystem / service (online charging);
- the functionality of online and offline charging for those domains / subsystems / services;
- 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 TS 32.240 [1].

The present document specifies the transaction based mechanism for the near real time transfer of CDRs within the network.

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 the CDRs are specified in TS 32.298 [51];
- The file based mechanism used to transfer the CDRs from the network to the operator's Billing Domain (e.g. the post-processing system or a mediation device) is specified in TS 32.297 [52];

The 3GPP Diameter application that is used for 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 the 3GPP Vocabulary, TR 21.905 [100]. Those that are common across charging management in 3GPP domains services, or subsystems are provided in the umbrella document 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 TS 22.115 [101].

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

[12] - [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) parameter description".

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

[53] - [99] Void.

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

[101] 3GPP TS 22.115: "Service aspects; Charging and billing".

[102] - [199] Void.

[200] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

[201] 3GPP TS 29.274: "3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".

[202] - [299] Void.

[300] - [399] Void.

[400] - [403] Void.

[404] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).

[405] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).

[406] IETF RFC 791 (1981): "Internet Protocol" (STD 5).

[407] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).

3 Definitions, symbols and abbreviations

3.1 Definitions

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

2G- / 3G-: prefixes 2G- and 3G- refers to functionality that supports only GSM or UMTS, respectively, e.g. 2G-CDF refers only to the GSM functionality of an CDF.

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

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

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

chargeable event: activity utilizing telecommunications network infrastructure 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 wants to charge for.

charged party: user involved in a chargeable event who has to pay parts or the whole charges of the chargeable event, or a third party paying the charges caused by one or all users involved in the chargeable event, or a network operator.

charging: function whereby information related to a chargeable event is formatted and transferred 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 function: entity inside the core 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 mode.

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

GPRS: Packet Services for GSM and UMTS systems.

GTP': GPRS protocol, used for CDR transport. It is derived from GTP with enhancements to improve transport reliability necessary for CDRs. NOTE:This protocol is not used for tunnelling.

GSM only: qualifier indicating that this clause or paragraph applies only to a GSM system. For multi-system cases this is determined by the current serving radio access network.

inter-system change: change of radio access between different radio access technologies such as GSM and UMTS.

in GSM,...: qualifier indicating that this paragraph applies only to GSM System.

in UMTS,...: qualifier indicating that this paragraph applies only to UMTS System.

middle tier 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 TS 32.250 [10] to TS 32.27x [3x], e.g. TS 32.250 [10] for the CS domain, or TS 32.270 [30] for the MMS service. Currently, there is only one "tier 1" TS in 3GPP, which is the 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 BD interface or common charging applications.

near real time: near real time charging and billing information is to be generated, processed, and transported to a desired conclusion in less than one (1) minute.

observed IMEI ticket: record used to describe an EIR relevant event e.g. a blacklisted IMEI.

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 session/service control is required.

Online Charging System: the entity that performs real-time credit control. Its functionality includes transaction handling, rating, online correlation and management of subscriber accounts/balances.

packet switched domain: domain in which data is transferred between core network elements.

Real-time: real time charging and billing information is to be generated, processed, and transported to a desired conclusion in less than 1 second.

subscriber: A subscriber is an entity (associated with one or more users) that is engaged in a Subscription with a service provider. The subscriber is allowed to subscribe and unsubscribe services, to register a user or a list of users authorized to enjoy these services, and also to set the limits relative to the use that associated users make of these services.

UMTS only: qualifier indicating that this clause or paragraph applies only to a UMTS system. For multi-system cases this is determined by the current serving radio access network.

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.

3.2 Symbols

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

Bx	The reference point between any (generic) 3G domain, subsystem or service CGF and the BD.
Ga	Reference point between a CDF and the CGF for CDR transfer.
Rf	Reference Point between the CTF within a 3G network element and the CDF for offline charging.

3.3 Abbreviations

For the purposes of the present document, the abbreviations defined in TR 21.905 [50] and the following abbreviations apply:

3G	3rd Generation
3GPP	3rd Generation Partnership Project
AS	Application Server
ASN.1	Abstract Syntax Notation One
BD	Billing Domain
CDF	Charging Data Function
CDR	Charging Data Record
CG	Charging Gateway
CGF	Charging Gateway Function
CS	Circuit Switched
DRP	Data Record Packet
EPC	Evolved Packet Core
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
GPRS	General Packet Radio Service
GTP	GPRS Tunnelling Protocol
GTPv2-C	GTP version 2 – Control Plane
GTP'	GPRS protocol, used for CDR transport
IE	Information Element
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
NE	Network Element
OAM&P	Operation, Administration, Maintenance and Provisioning
OCS	Online Charging System
PDN	Packet Data Network
PS	Packet-Switched
PT	Protocol Type (Field in GTP' header)
S-SMO-CDR	SGSN Short Message Mobile Originated - CDR
TAP	Transferred Account Procedure
TLV	Type, Length, Value (GTP header format)
TV	Type, Value