

ETSI TS 132 251 V12.7.0 (2014-10)



**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);**

LTE;

Telecommunication management;

Charging management;

**Packet Switched (PS) domain charging
(3GPP TS 32.251 version 12.7.0 Release 12)**



ReferenceRTS/TSGS-0532251v70

Keywords

GSM,LTE,UMTS

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Foreword

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1 Scope

The present document is part of a series of Technical Specifications (TSs) specifying charging functionality and charging management in Packet Switched 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 documents 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 the charging TSs is defined in TS 32.240 [1].

The present document specifies the offline and online charging description for the Packet Switched (PS) domain based on the functional stage 2 description in TS 23.060 [201], TS 23.401 [208] and TS 23.402 [209].

The offline and online charging description for the PS domain encompasses also fixed broadband access in the convergent scenario deployment (i.e. both the fixed broadband access network and Evolved Packet Core (EPC) owned by a single operator) based on the functional stage 2 description in the corresponding Annex of TS 23.203 [215].

This charging description includes the offline and online charging architecture and scenarios specific to the PS domain, as well as the mapping of the common 3GPP charging architecture specified in TS 32.240 [1] onto the PS 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 the CDRs 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 PS domain offline and online charging is specified in TS 32.299 [50].

Note that a CAMEL based prepaid function and protocol is also specified for the PS domain (TS 23.078 [206] and TS 29.078 [202]). CAMEL entities and functions are outside the scope of the present document.

All terms, definitions and abbreviations used in the present document, which are common across 3GPP TSs, are defined in TR 21.905 [100]. Those that are common across charging management in PS 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] - [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] 3GPP TS 32.271: "Telecommunication management; Charging management; Location Services (LCS) charging".
- [32] void.
- [33] 3GPP TS 32.273: "Telecommunication management; Charging management; Multimedia Broadcast and Multicast Service (MBMS) charging".
- [34] 3GPP TS 32.274: "Telecommunication management; Charging management; Short Message Service (SMS) charging".
- [35] - [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 Records (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] 3GPP TS 22.115: "Service aspects; Charging and billing".
- [102] - [199] Void.
- [200] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".
- [201] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [202] 3GPP TS 29.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL) Phase X; CAMEL Application Part (CAP) specification".
- [203] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

- [204] Void.
- [205] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".
- [206] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL); Phase 4; Stage 2".
- [207] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".
- [208] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".
- [209] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [210] 3GPP TS 29.274: "3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".
- [211] 3GPP TS 29.275: "Proxy Mobile IPv6 (PMIPv6) based Mobility and Tunnelling protocols; Stage 3".
- [212] 3GPP TS 23.261: "IP flow mobility and seamless Wireless Local Area Network (WLAN) offload; Stage 2".
- [213] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".
- [214] Void.
- [215] 3GPP TS 23.203: "Policy and charging control architecture".
- [216] 3GPP TS 29.212: "Policy and Charging Control (PCC); Reference points".
- [217] - [400] Void.
- [401] IETF RFC 3588 (2003): "Diameter Base Protocol".
- [402] IETF RFC 4006 (2005): "Diameter Credit-Control Application".
- [403] - [599] Void.
- [600] Broadband Forum TR-146: "Internet Protocol (IP) Sessions".
- [601] Broadband Forum TR-134: "Broadband Policy Control Framework (BPCF)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions defined in TR 21.905 [100], TS 32.240 [1] and TS 22.060 [200], and the following apply:

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

When the term/prefix is omitted, reference is made independently from the GSM or UMTS functionality.

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 (BD): 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 or other (e.g. statistical) end applications. It is only applicable to offline charging (see "Online Charging System" for equivalent functionality in online charging).

CAMEL: network feature that provides the mechanisms to support operator specific services even when roaming outside HPLMN.

CAMEL subscription information: identifies a subscriber as having CAMEL services.

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 (O_M):** A field that operators have provisioned to always be included in the CDR.
- **Operator Provisionable: Conditional (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).

charged party: user involved in a chargeable event that 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: a function within the telecommunications network and the associated OCS/BD components whereby information related to a chargeable event is collected, 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 is 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.