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TECHNICAL SPECIFICATION

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Contents

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. The GSM/UMTS 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 and subsystem (offline charging);
- the content of real-time charging messages 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 of the charging management TSs is defined in TS 32.240 [1].

The present document covers all internal aspects of the Online Charging System (OCS). The document contains the architecture and functions of the OCS logical components and thereby derives the functionality of the OCS interfaces. A detailed specification of interfaces between the logical OCS components is also included. The functionality of the OCS, as described in the present document, applies to all charging domains (bearer, session and service).

The interfaces connecting to the OCS (e.g. Ro, CAP) are out of the scope of the present document.

NOTE: In the current release the present document is limited to the interface between the charging function and the Rating Function(RF), namely Re.

All terms, definitions and abbreviations used in the present document, that are common across 3GPP TSs, are defined in 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]. 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] - [10] Void.

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

[12] - [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] 3GPP TS 32.272: "Telecommunication management; Charging management; Push-to-talk over Cellular (PoC) charging".

[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] 3GPP TS 32.275: "Telecommunication management; Charging management; MultiMedia Telephony (MMTel) charging".

[36] 3GPP TS 32.276: "Telecommunication management; Charging management; Voice Call Service Charging".

[37] 3GPP TS 32.277: "Telecommunication management; Charging management; Proximity-based Services (ProSe) Charging".

[38] - [39] Void.

[40] 3GPP TS 32.280: "Telecommunication management; Charging management; Advice of Charge (AoC) service ".

[41] - [49] Void.

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

[51] Void.

[52] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Records (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".

[101] - [200] Void.

[201] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[202] 3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 4; Stage 2".

[203] 3GPP TS 23.003: "Numbering, addressing and identification".

[204] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[205] 3GPP TS 29.230: "Diameter applications; 3GPP specific codes and identifiers".

[206] 3GPP TS 23.203: "Policy and charging control architecture".

[207] 3GPP TS 29.219: "Policy and charging control: Spending limit reporting over Sy reference point ".

[208] 3GPP TS 29.213: "Policy and charging control signalling flows and Quality of Service (QoS) parameter mapping".

[209] - [400] Void.

[401] IETF RFC 6733 (2012): "Diameter Base Protocol".

[402] IETF RFC 4006 (2005): "Diameter Credit-Control Application".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

account: structure residing in the OCS for holding dynamic subscription data with monetary equivalence. Accounts may have balances/counters of currency or a unit type. An account can have one or more users associated with it. Examples of account type could include individual, family, corporate, etc. As opposed to bank accounts, transaction history is not necessarily kept in the OCS account data structure.

account balance: represents the current numerical value from which service delivery decisions can be determined.

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 (offline charging) or the subscribers account balance may be debited (online charging).

counter: aggregation of units of service usage or monetary units, which may be in relation to subscriber contractual terms (e.g. number of used SMS per day or number of free minutes per month).
These form the basis for any type of loyalty program like discounts or bonus.

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

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

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 authorised to enjoy these services, and also to set the limits relative to the use that associated users make of these services.

subscription: a subscription describes the commercial relationship between the subscriber and the service provider.

tariff: set of parameters defining the network utilization charges for the use of a particular bearer / session / service.

3.2 Symbols

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

Bo	Offline Charging Reference Point towards the operator's post-processing system
Ga	Reference point for CDR transfer between a CDF and the CGF
Rc	Online Charging Reference Point towards the ABMF
Re	Online Charging Reference Point towards the RF
Ro	Online Charging Reference Point towards the online charging functions (EBCF, SBCF)
Rr	Online Charging Reference Point towards an external account recharging server
Sy	Reference point for policy enforcement between OCF and the PCRF

3.3 Abbreviations

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

APN	Access Point Name
AoC	Advice of Charge
CAMEL	Customised Applications for Mobile network Enhanced Logic
CAP	CAMEL Application Part
CCA	Credit Control Answer
CCR	Credit Control Request
CDF	Charging Data Function
CDR	Charging Data Record
CGF	Charging Gateway Function
CS	Circuit Switched
CSCF	Call Session Control Function
EBCF	Event Based Charging Function
ECUR	Event Charging with Unit Reservation
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
FBC	Flow Based Charging
GMLC	Gateway Mobile Location Center
GPRS	General Packet Radio Service
HTTP	HyperText Transfer Protocol
IEC	Immediate Event Charging
IMS	IP Multimedia core network Subsystem
IMSI	International Mobile Subscriber Identity

IP	Internet Protocol
ISC	IMS Service Control
ISDN	Integrated Services Digital Network
LCS	LoCation Services
MAP	Mobile Application Part
MBMS	Multimedia Broadcast and Multicast Service
MMS	Multimedia Messaging Service
MMTel	Multimedia Telephony
MSC	Mobile Services Switching Centre
MSISDN	Mobile Station ISDN number
MVNO	Mobile Virtual Network Operator
OCF	Online Charging Function
OCS	Online Charging System
PCC	Policy and Charging Control
PCEF	Policy and Charging Enforcement Function
PCRF	Policy and Charging Rules Function
PoC	Push-to-talk over Cellular
ProSe	Proximity-based Services
PRQ	PriceRequest
PRS	PriceResponse
PS	Packet-Switched
P-GW	PDN Gateway
QoS	Quality of Service
RF	Rating Function
SBCF	Session Based Charging Function
SGSN	Serving GPRS Support Node
SIP	Session Initiation Protocol
SMS	Short Message Service
SUQ	ServiceUsageRequest
SUS	ServiceUsageResponse
TDF	Traffic Detection Function
TRQ	TariffRequest
TRS	TariffResponse
URL	Uniform Resource Locator
VCS	Voice Call Service

4 Required functionality of the OCS

The OCS shall support mechanisms for:

- online bearer charging towards access / core network entities (e.g. SGSN, PCEF, TDF). Online charging interfaces to be supported are Ro and CAP;
- online charging of applications/services that are provided to subscribers via service nodes (outside the core network) e.g. MMS and LCS. The online charging interface to be supported is Ro;
- IMS online charging. Online charging interface to be supported is Ro;
- account balance management towards external account management servers e.g. recharge server, hot billing server;
- generation of Charging Data Records (CDRs) and their transfer to the operator's post-processing system;
- spending limit and balance monitoring and reporting based on subscription or configuration within OCS, towards Policy and Charging Rule Function.

The OCS may optionally support mechanisms for:

- correlation of bearer, service and IMS charging.

To support these requirements, the functions listed below are necessary in the OCS:

1. rating (before and/or after service consumption):
   - unit determination: calculation and reservation of a number of session-related non-monetary units (service units, data volume, time and events);
   - price determination: calculation of monetary units (price) for a given number of non-monetary units;
   - tariff determination: determination of tariff information based on the subscribers contractual terms and service being requested (e.g. information for AoC);
   - get/set counters applicable for rating (alternatively these counters can be here or in the subscriber account balance management; for further details refer to clause 5.2.2).
2. subscriber account balance management:
   - check account balance;
   - account balance update (credit/debit);
   - account balance reservation;
   - get/set counters;
   - get/set expiry date of the (pre-paid) account (optional).
3. charging transaction control:
   - perform charging control on request basis for bearer and events/services;
   - immediate charging and charging with reservation;
   - generation of charging information/CDR per charging transaction.
4. advice of charge support (defined in TS 32.280 [40]):
   - receive tariff information from external system;
   - provide Advice of Charge (AoC) information (tariff and/or cost).

To support the correlation requirements, the functions listed below are possible in the OCS:

5. correlation function:
   - context handling of bearer, service and IMS charging events related to a given subscriber;
   - generation of a combined multiple event and session requests to the Rating Function.