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Charging architecture and principles
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Foreword

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1 Scope

The present document is part of a series of documents that specify charging functionality and charging management in 3GPP networks/systems. The 3GPP core network charging architecture and principles are specified in the present document, which thus 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 events 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 purposes of the present document are:

- to lay down common principles of charging in the network; and
- to specify a logical common charging architecture that applies to all 3GPP domains, subsystems and services.

A set of domain/subsystem/service specific TSs covers the domains (CS, PS, 5GS), subsystem (IMS) and service (MMS, LCS, PoC, MBMS, SMS, MMTel etc.) levels, respectively, in the TS 32.25x, TS 32.26x and TS 32.27x TS number ranges. These TSs describe the mapping of the common architecture specified in the present document onto the specific domain/subsystem/service and the scenarios and information for online and offline charging that are specific to the domain/subsystem/service. They are commonly referred to as the middle tier charging TSs.

A set of TSs in the TS 32.28x range covers common services, such as the Advice of Charge service.

A set of TSs in the TS 32.29x range covers common aspects, such as CDR parameter and syntax descriptions, online and offline charging applications, and the charging interactions within the network (CDR transfer) as well as between the network and the Billing Domain (CDR file transfer).

The complete document structure for these TSs is outlined in the following figure 1.1:

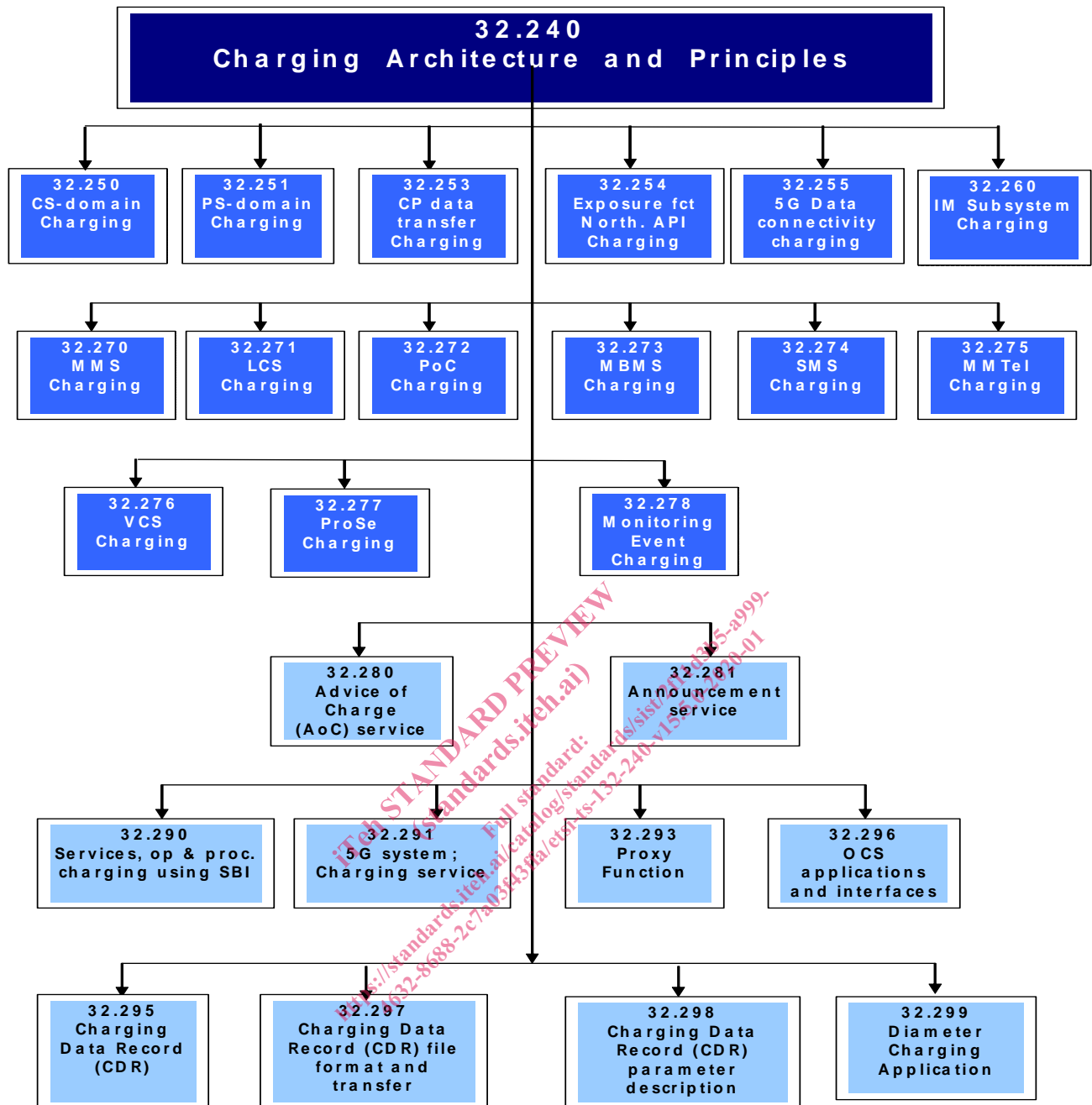


Figure 1.1: Charging specifications structure

In addition to GSM/UMTS and EPS core network charging architecture and principles, this document encompasses charging architecture and principles for the convergent scenario (i.e. both the Fixed Broadband Access network and Evolved Packet Core (EPC) owned by a single operator), which is specified in annex C.

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 network domains, services or subsystems are provided in the present document (umbrella TS), and are copied into clause 3 of the other TSs depicted in the figure 1.1, 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] - [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] Void.
- [13] 3GPP TS 32.253: "Telecommunication management; Charging management; Control Plane (CP) data transfer domain charging".
- [14] 3GPP TS 32.254: "Telecommunication management; Charging management; Exposure function Northbound Application Program Interfaces (APIs) charging".
- [15] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G Data connectivity domain charging; stage 2".
- [16] - [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] 3GPP TS 32.278: "Telecommunication management; Charging management; Monitoring Event charging".
- [39] Void.
- [40] 3GPP TS 32.280: "Telecommunication management; Charging management; Advice of Charge (AoC) service".
- [41] 3GPP TS 32.281: "Telecommunication management; Charging management; Announcement service".
- [42] - [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] 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] Void.
- [56] 3GPP TS 32.293: "Telecommunication management; Charging management; Proxy Function".
- [57] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)".
- [58] 3GPP TS 32.291: "Telecommunication management; Charging management; 5G system; Charging service, stage 3".
- [59] - [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] - [206] Void.
- [207] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL); Stage 2".
- [208] 3GPP TS 23.203: "Policy and charging control architecture".
- [209] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".
- [210] Void.
- [211] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".
- [212] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".
- [213] 3GPP TS 24.002: "GSM - UMTS Public Land Mobile Network (PLMN) access reference configuration".
- [214] 3GPP TS 23.502: "Procedures for the 5G System".

- [215] - [297] Void.
- [298] EU Roaming regulation III; "Structural Solutions; High Level Technical Specifications".
- [299] EU Roaming regulation III; "Interface & Protocol; Detailed Technical Specifications".
- [300] ITU-T Recommendation D.93: "Charging and accounting in the international land mobile telephone service (provided via cellular radio systems)".
- [301] - [399] Void.
- [400] - [401] Void.
- [402] IETF RFC 4006 (2005): "Diameter Credit-Control Application".
- [403] - [499] Void.
- [500] GSMA PRD BA.27: "Charging Principles".

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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] 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.

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

accounting meter record: record containing one or more counters employed to register the usage of resources en masse. Includes simple event counters and/ or cumulative call second counters.

Advice of Charge (AoC): real-time display of the network utilization charges incurred by the Mobile Station. The charges are displayed in the form of charging units. If a unit price is stored by the MS then the display may also include the equivalent charge in the home currency.

AoC service: combination of one or more services, both basic and supplementary, together with a number of other charging relevant parameters to define a customized service for the purpose of advice of charge.

Application Based Charging (ABC): ability to perform charging on an application basis for network usage based upon application detection.

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 core network, which 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.

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, short messages, interconnection); or
- mobility (e.g. roaming or inter-system handover); or
- user to application/service communication ; 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: 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 subscriber's account balance may be debited (online charging).

Charging Data Record (CDR): 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.