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Foreword

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1 Scope

The present document specifies the protocol that is used for service based interface. The API definitions and data type definitions are aligned with the common charging architecture specified in TS 32.240 [1]. 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 5G data connectivity charging is specified in TS 32.255 [30].
- The 5G connection and mobility charging is specified in TS 32.256 [31].
- The service, operations and procedures of 5G charging for service based interface is specified in TS 32.290 [58].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition of the 5G System are specified in 3GPP TS 29.500 [299] and 3GPP TS 29.501 [300].

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] - [13] Void.
- [14] 3GPP TS 32.254: "Telecommunication management; Charging management; Exposure function Northbound Application Program Interfaces (APIs) charging".
- [15] - [28] Void.
- [29] 3GPP TS 32.274: "Telecommunication management; Charging management; Short Message Service (SMS) charging".
- [30] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G Data connectivity domain charging; stage 2".
- [31] 3GPP TS 32.256: "Telecommunication management; Charging management; 5G connection and mobility domain charging; stage 2".
- [32] - [49] Void.
- [50] - [57] Void.
- [58] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)".
- [59] - [69] Void.
- [70] 3GPP TS 28.201: "Charging management; Network slice performance and analytics charging in the 5G System (5GS); Stage 2".
- [71] 3GPP TS 28.202: "Charging management; Network slice management charging in the 5G System (5GS); Stage 2".

- [72] - [99] Void.
- [100] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [101] 3GPP TR 21.900: "Technical Specification Group working methods".
- [102] Void
- [103] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)"
- [104] - [199] Void
- [200] - [252] Void
- [253] 3GPP TS 28.532: "Management and orchestration; Management services".
- [254] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".
- [255] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".
- [256] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".
- [257] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".
- [258] - [298] Void
- [299] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".
- [300] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [301] 3GPP TS 29.594: "5G System; Spending Limit Control Service; Stage 3".
- [302] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".
- [303] 3GPP TS 24.501: "Non-Access-Stratum (NAS) Protocol for 5G System (5GS); Stage 3".
- [304] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".
- [305] 3GPP TS 29.510: "Network Function Repository Services; Stage 3".
- [306] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".
- [307] - [370] Void
- [371] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [372] - [389] Void
- [390] 3GPP TS 33.501: "Security architecture and procedures for 5G System".
- [391] - [399] Void
- [400] Void.
- [401] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".
- [402] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [403] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [404] - [499] Void.
- [500] OpenAPI: "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[501] - [599] Void.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [100].

3.2 Symbols

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

Nchf Service based interface exhibited by CHF.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AF	Application Function
AMF	Access and Mobility Management Function
ATSSS	Access Traffic Steering, Switching, Splitting
CHF	Charging Function
CEF	Charging Enablement Function
CTF	Charging Trigger Function
GPSI	Generic Public Subscription Identifier
GUAMI	Globally Unique AMF Identifier
I-SMF	Intermediate SMF
MnS	Management Service
NF	Network Function
PEI	Permanent Equipment Identifier
QBC	QoS flow Based Charging
QFI	QoS Flow Identifier
SMSF	Short Message Service Function
SMF	Session Management Function
SSC	Session and Service Continuity
SUPI	Subscription Permanent Identifier

4 Overview

4.1 Service architecture

The Converged Charging Service or Offline Only Charging Service is provided by the CHF to the consumer and shown in the SBI representation model in figure 4.1.1.

The ConvergedCharging Service (Nchf_ConvergedCharging) or Offline Only Charging Service (Nchf_OfflineOnlyCharging) is part of the Nchf service-based interface exhibited by the Charging Function (CHF). The list of NF Service Consumer(s) is provided in Table 5.1-1.

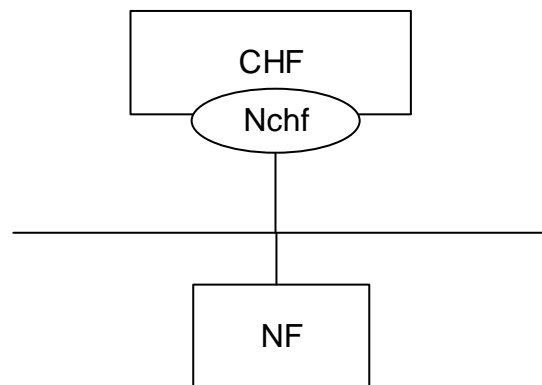


Figure 4.1.1: Reference Architecture for the NCHF_ConvergedCharging Service; SBI representation

4.2 Network functions

4.2.1 Charging Function (CHF)

The CHF is responsible for converged online charging and offline charging functionalities. The CHF provides the following:

- Quota;
- Re-authorisation triggers;
- Notification when Charging Domain determines rating conditions is affected or when CHF determines to terminate the charging service;
- Receiving service usage reports from NF Service Consumer; and
- CDRs generation.

4.2.2 NF Service Consumers

The NF Service Consumers shall support:

- Requesting and receiving the quota(s);
- Sending service usage reports; and
- Handling quota re-authorisation or abort notifications.

5 Services offered by the CHF

5.1 Introduction

The following services are provided by the CHF.

Table 5.1-1: NF Services provided by CHF

Service Name	Description	Consumer
Nchf_ConvergedCharging service	This service provides a converged charging for session and event based NF services, with and without quota management, as well as charging information record generation	SMF, SMSF, AMF, NEF, PGW-C+SMF, CEF, MnS Producer
Nchf_OfflineOnlyCharging service	This service provides an offline only charging for session based NF service.	SMF
Nchf_SpendingLimitControl	This service enables the PCF to retrieve policy counter status information per UE from the CHF by subscribing to spending limit reporting (i.e. notifications of policy counter status changes).	PCF

The "Nchf_SpendingLimitControl" service is defined in 29.594 [301].

5.2 Nchf_ConvergedCharging service

5.2.1 Service description

This service provides charging in converged charging scenario by the CHF to the NF service consumer as defined in subclause 6.2 in 3GPP TS 32.290[58].

It includes the following functionalities:

- Create resource at service establishment or no existing ChargingData resource, and may allocate quotas based on the request from NF consumer;
- During the service consumption lifecycle, update resource upon receiving the quota usage or service usage report under a number of circumstances and allocate subsequent quotas based on the request from NF consumer;
- Release upon service termination, Unit Count Inactivity Timer expiry or error response; and
- Notify NF Service Consumer of the re-authorisation triggers when CHF determines rating conditions is affected, or the abort triggers when CHF determines to terminate the charging service.
- Charging information record generation

5.2.2 Service operations

5.2.2.1 Introduction

The service operations defined for Nchf_ConvergedCharging are shown in table 5.2.2.1-1.