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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
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Contents

Foreword

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

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z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present specification provides the stage 3 definition of the Spending Limit Control Service of the 5G System.

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The stage 2 definition and related procedures for the Spending Limit Control Service are specified in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [6].

The 5G System stage 3 call flows are provided in 3GPP TS 29.513 [12].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

The Spending Limit Control Service is provided by the Charging Function (CHF) and enables the NF service consumer to retrieve policy counter status information. The internal CHF functionality for policy counter management provisioning is specified in 3GPP TS 32.240 [7].

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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[5] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[6] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[7] 3GPP TS 32.240: "Charging architecture and principles; Stage 2".

[8] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[9] OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[10] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[11] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces".

[12] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[13] IETF RFC 9457: "Problem Details for HTTP APIs".

[14] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[15] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[16] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[17] 3GPP TR 21.900: "Technical Specification Group working methods".

[18] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[19] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

3 Definitions 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 [1].

Nchf: Service-based interface exhibited by Charging Function.

Policy counter: A mechanism within the CHF to track spending applicable to a subscriber.

Policy counter identifier: A reference to a policy counter in the CHF for a subscriber.

Policy counter status: A label whose values are not standardized and that is associated with a policy counter's value relative to the spending limit(s) (the number of possible policy counter status values for a policy counter is one greater than the number of thresholds associated with that policy counter, i.e. policy counter status values describe the status around the thresholds). This is used to convey information relating to subscriber spending from CHF to PCF. Specific labels are configured jointly in CHF and PCF.

Spending limit: A spending limit is the usage limit of a policy counter (e.g. monetary, volume, duration) that a subscriber is allowed to consume.

Spending limit report: A notification, containing the current policy counter status generated from the CHF to the PCF.

3.2 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].

5G-RG	5G Residential Gateway
CCS	Converged Charging System
CHF	Charging Function
CTS	Charging Trigger Function
FN-RG	Fixed Network Residential Gateway
GCI	Global Cable Identifier
GLI	Global Line Identifier
GPSI	Generic Public Subscription Identifier
NF	Network Function
NRF	Network Repository Function
PCF	Policy Control Function
SUPI	Subscription Permanent Identifier
W-AGF	Wireline Access Gateway Function

4 Nchf_SpendingLimitControl Service

4.1 Service Description

4.1.1 Overview

The Nchf_SpendingLimitControl service, as defined in 3GPP TS23.502 [3] and 3GPP TS23.503 [6], is provided by the Charging Function (CHF).

The Nchf_SpendingLimitControl service enables the NF service consumer (e.g. PCF) to retrieve policy counter status information and spending limit reporting per UE from the CHF.

If the spending limit reporting is no more required, the Nchf_SpendingLimitControl service enables the NF service consumer to unsubscribe from the reporting.

Nchf_SpendingLimitControl Service applies to the cases where the PCF interacts with the CHF in the non-roaming scenario, and for roaming scenario the H-PCF for the PDU session interacts with the H-CHF in the home-routed scenario. Roaming scenarios are not supported for the PCF for the UE in this release of the specification.

4.1.2 Service Architecture

The Nchf_SpendingLimitControl service is provided by the CHF and consumed by the NF service consumer (e.g. PCF), as shown in figure 4.1.2-1 for the SBI representation model and in figure 4.1.2-2 for the reference point representation model.

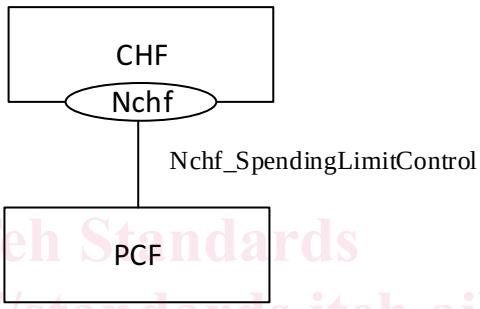

Figure 4.1.2-1: Nchf_SpendingLimitControl service architecture, SBI representation

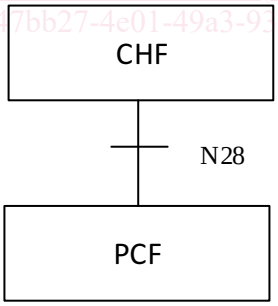

Figure 4.1.2-2: Nchf_SpendingLimitControl service architecture, reference point representation

4.1.3 Network Functions

4.1.3.1 Charging Function (CHF)

The Charging Function (CHF) is part of the Converged Charging System (CCS). The CHF provides the Nchf_SpendingLimitControl service and is specified in 3GPP TS 32.240 [7].

4.1.3.2 NF Service Consumers

The PCF is the known NF service consumer, as defined in 3GPP TS 23.502 [3]. The NF service consumer accesses policy counter status information relating to the subscriber spending from the CHF and uses the status of each relevant policy counter as input to its policy decision as required by the decision logic.

4.2 Service Operations

4.2.1 Introduction

The service operations defined for the Nchf_SpendingLimitControl service are shown in table 4.2.1-1.

Table 4.2.1-1: Nchf_SpendingLimitControl Service Operations

Service operation name	Description	Initiated by
Nchf_SpendingLimitControl_Subscribe	This service operation is used by NF service consumers to subscribe to notification of changes in the status of the policy counters available and retrieval of the status of the policy counters for which subscription is accepted.	NF service consumer (e.g. PCF)
Nchf_SpendingLimitControl_Unsubscribe	This service operation is used by NF service consumers to unsubscribe from notification of changes in the status of all policy counters.	NF service consumer (e.g. PCF)
Nchf_SpendingLimitControl_Notify	This service operation is used by the CHF to notify the NF service consumers about the change of the status of the subscribed policy counters. Alternatively, it can be used by the CHF to notify that the status for one or multiple subscribed policy counter will change in the future, indicating the time when this change shall be applied. Alternatively, it is also used to notify the NF service consumer of the removal of a subscriber from the CHF system for the purpose that the NF service consumer can terminate the subscriptions of all policy counters of the subscriber.	CHF

4.2.2 Nchf_SpendingLimitControl_Subscribe service operation

4.2.2.1 General

The Nchf_SpendingLimitControl_Subscribe service operation is used by the NF service consumer to subscribe to notification of changes in the status of the policy counters available and to retrieve the status of the policy counters for which the subscription is accepted. The following procedures are related to the subscribe service operation:

- initial spending limit retrieval; and
- intermediate spending limit report retrieval.

4.2.2.2 Initial spending limit retrieval

Figure 4.2.2.2-1 shows the scenario where the NF service consumer sends a request to the CHF to retrieve the status of policy counters available at the CHF and to subscribe to spending limit reporting (see also 3GPP TS 23.502 [3], figure 4.16.8.2.1).

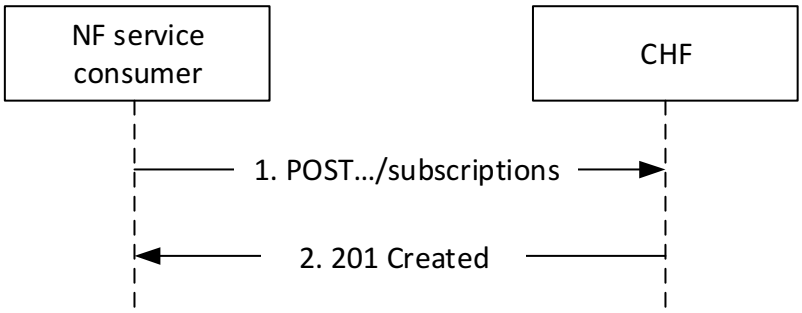

Figure 4.2.2.2-1: NF service consumer subscribes to retrieve policy counter status and spending limit reporting

The NF service consumer shall send an HTTP POST request to the resource "{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions" representing the "Spending Limit Retrieval Subscriptions", as shown in figure 4.2.2.2-1, step 1, to create a subscription for retrieval of the policy counter status and spending limit reporting.

The "SpendingLimitContext" data structure provided in the request body shall include:

- the Subscription Permanent Identifier (SUPI) encoded in the "supi" attribute;
- the notification correlation target address encoded in the "notifUri" attribute; and
- If the feature "NotificationCorrelation" is supported, a Notification Correlation Identifier assigned by the NF service consumer for the requested notifications encoded in the "notifId" attribute, if the "notifUri" does not encode within the provided URI the notification correlation Id.

NOTE: NF service consumer (e.g. PCF) ensures the combination of notifUri and notifId is unique per subscription in the whole network, including multiple network slices scenario.

The "SpendingLimitContext" data structure provided in the request body may include:

- the General Public Subscription Identifier (GPSI) encoded in the "gpsi" attribute;
- Event Filter information "list of policy counter identifier(s)" encoded in the "policyCounterIds" attribute. The "policyCounterIds" attribute shall contain the list of policy counter identifiers to be subscribed to. If the "policyCounterIds" attribute is omitted, the subscription is to all available policy counters; and
- when the feature "SubscriptionExpirationTimeControl" is supported by the NF service consumer, the NF service consumer may include an expiry time encoded in the "expiry" attribute, representing the time up to which the subscription is desired to be kept active. When the "expiry" attribute is omitted in the request, it represents the NF service consumer does not have any time constraint in the duration of the subscription.

If the CHF cannot successfully fulfil the received HTTP POST request due to an internal CHF error or due to the error in the HTTP POST request, the CHF shall send the HTTP error response as specified in clause 5.7.

If the subscriber specified in the request is unknown to the CHF, the CHF shall indicate in an HTTP "400 Bad Request" response the cause for the rejection with the "cause" attribute set to "USER_UNKNOWN".

If the CHF has no available policy counters specified for the subscriber, the CHF shall indicate in an HTTP "400 Bad Request" response the cause for the rejection with the "cause" attribute set to "NO_AVAILABLE_POLICY_COUNTERS ".

If one or more policy counters specified in the request in the "policyCounterIds" attribute are unknown to the CHF, and the CHF is configured to reject request, the CHF shall indicate in an HTTP "400 Bad Request" response the cause for the rejection with the "cause" attribute set to "UNKNOWN_POLICY_COUNTERS" and the unknown policy counter identifiers within the "invalidParams" attribute.

Otherwise, upon the reception of an HTTP POST request the CHF shall: