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Contents

Foreword

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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 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md.

[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 7807: "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".

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.

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].

CCS	Converged Charging System
CHF	Charging Function
CTS	Charging Trigger Function
GPSI	Generic Public Subscription Identifier
NF	Network Function
NRF	Network Repository Function
PCF	Policy Control Function
SUPI	Subscription Permanent Identifier

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 (i.e. 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).

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 the H-PCF interacts with the H-CHF in the home-routed scenario.

4.1.2 Service Architecture

The Nchf_SpendingLimitControl service is provided by the CHF and consumed by the 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.

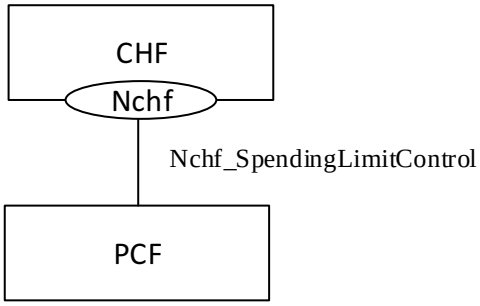

Figure 4.1.2-1: Nchf_SpendingLimitContol service architecture, SBI representation

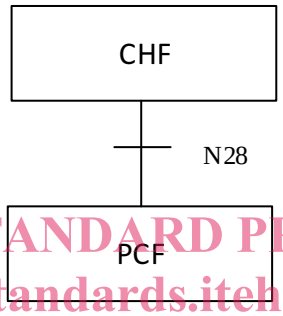

Figure 4.1.2-2: Nchf_SpendingLimitContol service architecture, reference point representation

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 an NF service consumer 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 (PCF)
Nchf_SpendingLimitControl_Unsubscribe	This service operation is used by an NF service consumer to unsubscribe from notification of changes in the status of all policy counters.	NF service consumer (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).

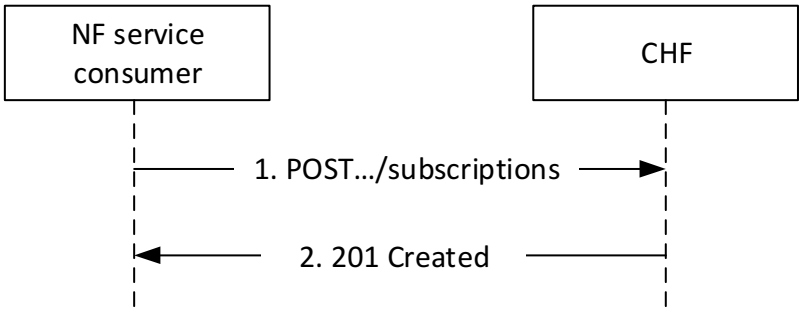

Figure 4.2.2.2-1: NF service consumer subscribes to retrieve policy counter status and spending limit reporting

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; and
- the notification correlation target address encoded in the "notifUri" attribute.

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

- the General Public Subscription Identifier (GPSI) encoded in the "gpsi" attribute; and
- 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.

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 subclause 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:

- create a new subscription resource, which contains the list of the policy counters included in the "policyCounterIds" attribute, or if the "policyCounterIds" attribute is omitted, all the policy counters of the subscriber;

- assign a subscriptionId; and
- store the subscription resource.

After the CHF created an "Individual Spending Limit Retrieval Subscription" resource, the CHF shall respond with "201 Created" response with a Location header field containing the URI of the created subscription resource and the message body containing a representation of the created subscription, as shown in figure 4.2.2.2-1, step 2.

The SpendingLimitStatus data structure provided in the response body shall include the status of the requested subscribed policy counters in the "statusInfos" map, where every PolicyCounterInfo entry shall contain:

- the policy counter identifier in the "policyCounterId" attribute; and
- the policy counter status in the "currentStatus" attribute.

When a requested policy counter identifier is known by the CHF, but it is not applicable to the subscriber (e.g. not provisioned), the CHF may include it in the "statusInfos" map, and set the "currentStatus" attribute to an operator configured policy counter status to indicate this to the NF service consumer.

When one or more policy counters specified in the request in the "policyCounterIds" attribute are unknown to the CHF, and the CHF is configured to accept the request, the CHF may include the unknown policy counters in the "statusInfos" map, and set the "currentStatus" attribute to an operator configured policy counter status to indicate this to the NF service consumer.

A PolicyCounterInfo data structure may include the list of the pending policy counter statuses and their activation times within the attribute "penPolCounterStatuses".

4.2.2.3 Intermediate spending limit report retrieval

Figure 4.2.2.3-1 shows the scenario where the NF service consumer sends a request to the CHF to modify the existing subscription to the retrieval of spending limit reports (see also 3GPP TS 23.502 [3], figure 4.16.8.3.1). The NF service consumer can add or remove policy counters to retrieve the status of the counters.

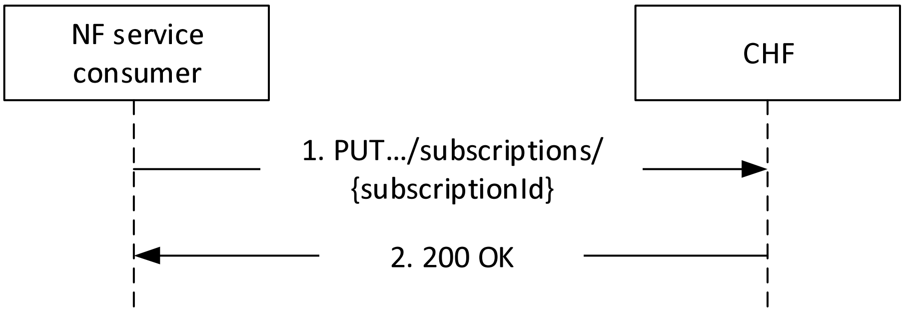

Figure 4.2.2.3-1: NF service consumer modifies the subscription to retrieve policy counter status and spending limit reporting

The NF service consumer shall send an HTTP PUT request to the resource "{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions/{subscriptionId}" representing an existing "Individual Spending Limit Subscription" resource, as shown in figure 4.2.2.3-1, step 1, to modify the 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;
- shall include the notification correlation target address encoded in the "notifUri" attribute;

NOTE 1: If the notification correlation target address is not changed the previously provided notification correlation target address is included in the "notifUri" attribute.

- if the General Public Subscription Identifier (GPSI) was provided within the initial spending limit retrieval procedure, described in subclause 4.2.2.2, shall include the GPSI encoded in the "gpsi" attribute; and
- may include Event Filter information as a "list of policy counter identifier(s)" encoded in the "policyCounterIds" attribute. The "policyCounterIds" attribute shall contain the updated list of policy counter identifiers to be subscribed to. If the "policyCounterIds" attribute is omitted, the subscription is updated to all available policy counters.

When the "policyCounterIds" attribute is present in the subscription request, this list of policy counters overrides a previously provisioned list.

After the CHF modified an "Individual Spending Limit Retrieval Subscription" resource, the CHF shall respond with "200 OK" response with the message body containing a representation of the modified subscription, as shown in figure 4.2.2.3-1, step 2.

The SpendingLimitStatus data structure provided in the response body shall include the status of the requested subscribed policy counters in the "statusInfos" map, where every PolicyCounterInfo entry shall contain:

- the policy counter identifier in the "policyCounterId" attribute; and
- the policy counter status in the "currentStatus" attribute.

When a requested policy counter identifier is known by the CHF, but it is not applicable to the subscriber (e.g. not provisioned), the CHF may include it in the "statusInfos" map, and set the "currentStatus" attribute to an operator configured policy counter status to indicate this to the NF service consumer.

When one or more policy counters specified in the request in the "policyCounterIds" attribute are unknown to the CHF, and the CHF is configured to accept the request, the CHF may include the unknown policy counters in the "statusInfos"