ETSI TS 129 594 V15.4.0 (2019-10)

5G;
5G System;
Spending Limit Control Service;
Stage 3
(3GPP TS 29.594 version 15.4.0 Release 15)

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Reference
RTS/TSGC-0329594vf40

Keywords
5G

ETSI

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Contents

Intellectual Property Rights 2
Legal Notice 2
Modal verbs terminology 2
Foreword 5
1 Scope 6
2 References 6
3 Definitions and abbreviations 7
3.1 Definitions 7
3.2 Abbreviations 7
4 Nchf_SpendingLimitControl Service 7
4.1 Service Description 7
4.1.1 Overview 7
4.1.2 Service Architecture 7
4.1.3 Network Functions 8
4.1.3.1 Charging Function (CHF) 8
4.1.3.2 NF Service Consumers 8
4.2 Service Operations 8
4.2.1 Introduction 8
4.2.2 Nchf_SpendingLimitControl_Subscribe service operation 9
4.2.2.1 General 9
4.2.2.2 Initial spending limit retrieval 9
4.2.2.3 Intermediate spending limit report retrieval 10
4.2.3 Nchf_SpendingLimitControl_Unsubscribe service operation 11
4.2.3.1 General 11
4.2.3.2 Unsubscribe from spending limit reporting 11
4.2.4 Nchf_SpendingLimitControl_Notify service operation 12
4.2.4.1 General 12
4.2.4.2 Spending limit report 12
4.2.4.3 Subscription termination request by CHF 13
5 Nchf_SpendingLimitControl Service API 14
5.1 Introduction 14
5.2 Usage of HTTP 14
5.2.1 General 14
5.2.2 HTTP standard headers 14
5.2.2.1 General 14
5.2.2.2 Content type 14
5.2.3 HTTP custom headers 15
5.2.3.1 General 15
5.3 Resources 15
5.3.1 Resource Structure 15
5.3.2 Resource: Spending Limit Retrieval Subscriptions (Collection) 15
5.3.2.1 Description 15
5.3.2.2 Resource definition 15
5.3.2.3 Resource Standard Methods 16
5.3.2.3.1 POST 16
5.3.2.4 Resource Custom Operations 16
5.3.3 Resource: Individual Spending Limit Retrieval Subscription (Document) 16
5.3.3.1 Description 16
5.3.3.2 Resource definition 16
5.3.3.3 Resource Standard Methods 17
5.3.3.3.1 PUT 17
5.3.3.3.2 DELETE 17
5.4 Custom Operations without associated resources 18

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5.5 Notifications 18
5.5.1 General 18
5.5.2 Spending limit notification 18
5.5.2.1 Description 18
5.5.2.2 Target URI 18
5.5.2.3 Standard Methods 18
5.5.2.3.1 POST 18
5.5.3 Subscription Termination 19
5.5.3.1 Description 19
5.5.3.2 Target URI 19
5.5.3.3 Standard Methods 19
5.5.3.3.1 POST 19
5.6 Data Model 20
5.6.1 General 20
5.6.2 Structured data types 20
5.6.2.1 Introduction 20
5.6.2.2 Type SpendingLimitContext 21
5.6.2.3 Type SpendingLimitStatus 22
5.6.2.4 Type PolicyCounterInfo 22
5.6.2.5 Type PendingPolicyCounterStatus 22
5.6.2.6 Type SubscriptionTerminationInfo 23
5.6.3 Simple data types and enumerations 23
5.6.3.1 Introduction 23
5.6.3.2 Simple data types 23
5.6.3.3 Enumeration: TerminationCause 23
5.7 Error handling 23
5.7.1 General 23
5.7.2 Protocol Errors 23
5.7.3 Application Errors 24
5.8 Feature negotiation 24
5.9 Security 24

Annex A (normative): OpenAPI specification 25

A.1 General 25

A.2 Nchf_SpendingLimitControl Service API 25

Annex B (informative): Change history 30

History 33

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(standards.iteh.ai)
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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.
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[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".

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

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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 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.

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.

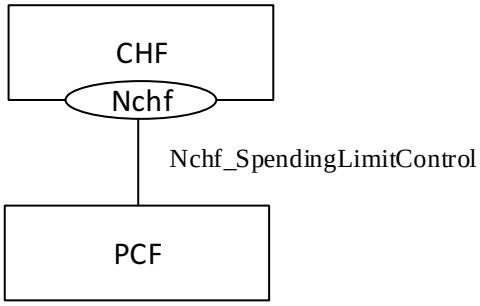

Figure 4.1.2-1: Nchf_SpendingLimitContol service architecture, SBI representation

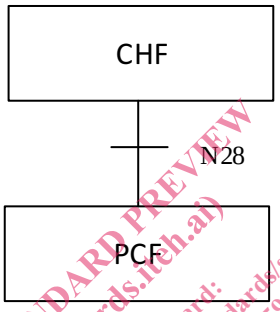

Figure 4.1.2-2: Nchf_SpendingLimitContol service architecture, reference point representation

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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

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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 "CHF 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 data structure provided in the request body shall include:

- the Subscription Permanent Identifier (SUPI); and
- the notification correlation target address.

The data structure provided in the request body may include:

- the General Public Subscription Identifier (GPSI); and
- Event Filter information "list of policy counter identifier(s)".

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 ".

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

- create a new subscription;
- assign a subscriptionCorrelationId; and
- store the subscription.

After the CHF created an "Individual CHF Subscription" resource, the CHF shall respond with "201 Created" with the message body containing a representation of the created subscription, as shown in figure 4.2.2.2-1, step 2.

The data structure provided in the response body shall include:

- the status of the requested subscribed policy counters to the subscriber in the event information.

The data structure provided in the response body may include:

- pending policy counter statuses and their activation times for all policy counter(s) available for the subscriber;
- if a list of policy counter identifier(s) was provided, the CHF returns only the pending policy counter statuses and their activation times, per required policy counter identifier in the event Information

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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.