ETSI TS 129 594 V15.3.0 (2019-04)

TECHNICAL SPECIFICATION

**5G;
5G System;
Spending Limit Control Service;
Stage 3
(3GPP TS 29.594 version 15.3.0 Release 15)**

Reference
RTS/TSGC-0329594vf30

Keywords
5G

ETSI

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Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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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".

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 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.
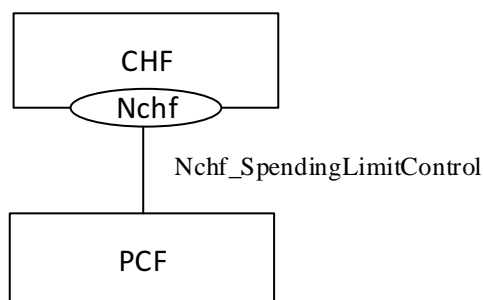
Figure 4.1.2-1: Nchf_SpendingLimitContol service architecture, SBI representation
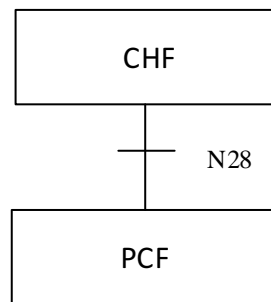
Figure 4.1.2-2: Nchf_SpendingLimitContol service architecture, reference point representation

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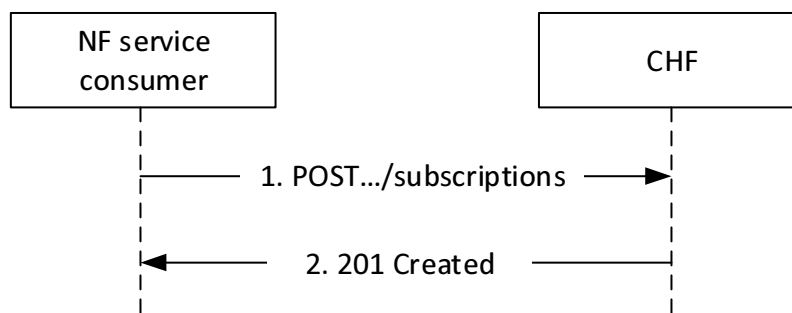
Figure 4.2.2.2-1: NF service consumer subscribes to retrieve policy counter status and spending limit reporting

The NF service consumer shall send an HTTP POST request to the resource "{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions" representing the "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

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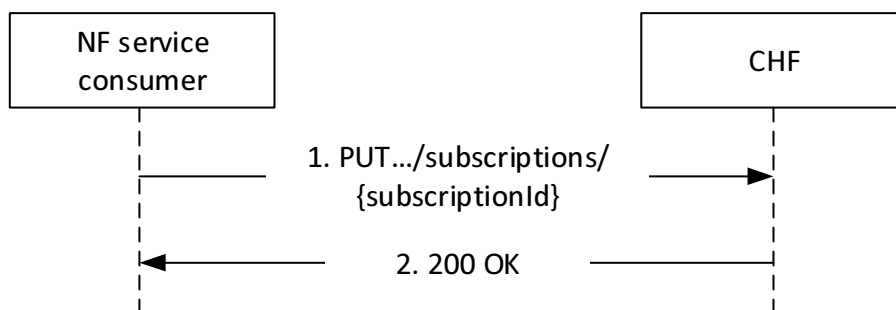
Figure 4.2.2.3-1: NF service consumer modifies the subscription to retrieve policy counter status and spending limit reporting

The NF service consumer shall send an HTTP PUT request to the resource "{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions/{subscriptionId}" representing an existing "CHF Subscriptions", 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 data structure provided in the request body may include:

- Event Filter information "list of policy counter identifier(s)"; and

- a new notification correlation target address.

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

If the HTTP PUT request is not accepted by the CHF, it shall indicate the appropriate cause for the rejection in the HTTP response code to the NF service consumer. 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 ".

4.2.3 Nchf_SpendingLimitControl_Unsubscribe service operation

### 4.2.3.1 General

The Nchf_SpendingLimitControl_Unsubscribe service operation is used by the NF service consumer to cancel the subscription of status changes for all the policy counters available at the CHF. That means the complete cancellation of the spending limit reporting procedure.

4.2.3.2 Unsubscribe from spending limit reporting

Figure 4.2.3.2-1 shows the scenario where the NF service consumer sends a request to the CHF to unsubscribe from spending limit reporting (see also 3GPP TS 23.502 [3] figure 4.16.8.4.1).
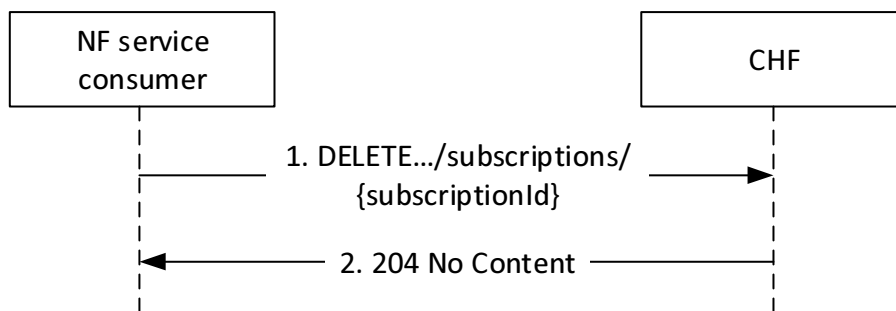
Figure 4.2.3.2-1: NF service consumer unsubscribes from spending limit reporting

The NF service consumer shall invoke the Nchf_SpendingLimitControl_Unsubscribe service operation to unsubscribe from the spending limit reporting (status change for all policy counters available is no more required). The NF service consumer shall send an HTTP DELETE request to the resource "{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions /{subscriptionId}", whereby the "{subscriptionId}" is the identification of the existing subscription to be deleted. Upon the reception of an HTTP DELETE request the CHF removes the corresponding subscription.

If the HTTP DELETE request is accepted by the CHF, it shall respond with "204 No Content" as shown in figure 4.2.3.2-1, step 2.

If the HTTP DELETE request is not accepted by the CHF, it shall indicate the appropriate cause for the rejection in the HTTP response code to the NF service consumer.

4.2.4 Nchf_SpendingLimitControl_Notify service operation

4.2.4.1 General

The Nchf_SpendingLimitControl_Notify service operation is used by the CHF:

- to notify the change of the status of the subscribed policy counters available at the CHF for that subscriber; and/or

- to provide one or more pending statuses for a subscribed policy counter together with the time they shall be applied; and/or

- to request the termination of the subscription of status changes for all policy counters for a subscriber (e.g. the subscriber is removed from the CHF system).

    NOTE: The SUPI represents the subscription Id.

4.2.4.2 Spending limit report

Figure 4.2.4.2-1 shows the scenario where the CHF sends a notification to the NF service consumer, when it detects that the status of a policy counter(s) has changed and the NF service consumer has subscribed to notifications of changes in the status of this policy counter(s). The CHF can also notify the NF service consumer that the status for one or multiple subscribed policy counter will change and indicate this by providing the time when this change shall be applied (see also 3GPP TS 23.502 [3], figure 4.16.8.5.1).
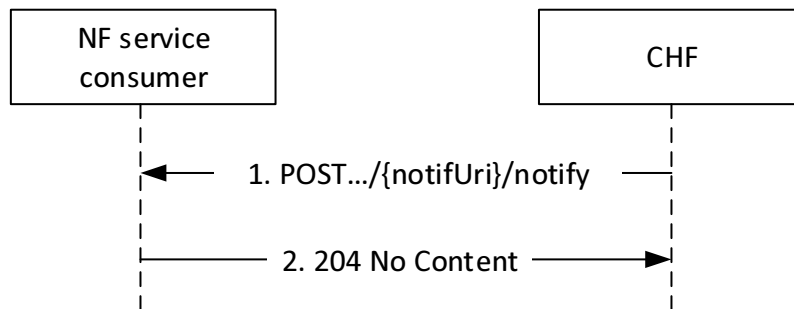
Figure 4.2.4.2-1: Spending limit reporting

The CHF shall send an HTTP POST request to the resource notification target address (notifUri) of the NF service consumer received in the subscription creation or modification, and shall append the "notify" segment path at the end of the URI, to indicate the NF service consumer the notification of a policy counter status change.

The data structure provided in the request body shall include:

- Subscriber Id; and

- Policy counter status as event information.

The data structure provided in the request body may include:

- Pending policy counter statuses and their activation times as event information.

If the HTTP POST notification request message is accepted by the NF service consumer, it shall acknowledge the receipt of the event notification with a "204 No Content" response, as shown in figure 4.2.4.2-1, step 2.

If the HTTP POST request is not accepted and the information received is not considered by the NF service consumer, the NF service consumer shall indicate the appropriate cause for the rejection in the HTTP response code to the CHF.

4.2.4.3 Subscription termination request by CHF

Figure 4.2.4.3-1 shows the scenario where the CHF sends a notification to the NF service consumer, when it requests the termination of the subscription of status changes for all policy counters for a subscriber.
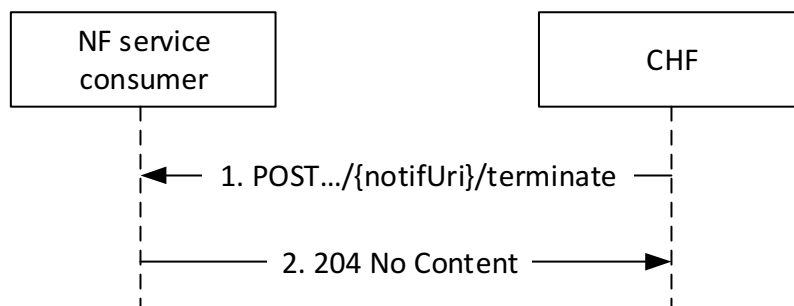
Figure 4.2.4.3-1: Subscription termination request by CHF

The CHF shall send an HTTP POST request to the resource notification target address (notifUri) of the NF service consumer received in the subscription creation or modification and shall append the "terminate" segment path at the end of the URI, to indicate the subscription termination to the NF service consumer.

The data structure provided in the request body shall include:

- Subscriber Id; and

- subscription termination information.

If the HTTP POST notification request message is accepted by the NF service consumer, it shall remove the subscription to notifications of all policy counters for a subscriber and shall acknowledge the receipt of the event notification with a "204 No Content" response, as shown in figure 4.2.4.3-1, step 2.

If the HTTP POST request is not accepted and the information received is not considered by the NF service consumer, the NF service consumer shall indicate the appropriate cause for the rejection in the HTTP response code to the CHF.

5 Nchf_SpendingLimitControl Service API

5.1 Introduction

The Nchf_SpendingLimitControl service shall use the Nchf_SpendingLimitControl API.

The request URI used in each HTTP request from the NF service consumer towards the CHF shall have the structure defined in subclause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

{apiRoot}/{apiName}/{apiVersion}/{apiSpecificResourceUriPart}

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS29.501 [5].

- The {apiName} shall be "nchf-spendinglimitcontrol".

- The {apiVersion} shall be "v1".

- The {apiSpecificResourceUriPart} shall be set as described in subclause 5.3.

5.2 Usage of HTTP

5.2.1 General

HTTP/2, IETF RFC 7540 [8], shall be used as specified in subclause 5.2 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in subclause 5.3 of 3GPP TS 29.500 [4].

The OpenAPI [9] specification of HTTP messages and content bodies for the Nchf_SpendingLimitControl service is contained in Annex A.

5.2.2 HTTP standard headers

5.2.2.1 General

See subclause 5.2.2 of 3GPP TS 29.500 [4] for the usage of HTTP standard headers.

5.2.2.2 Content type

JSON, IETF RFC 8259 [10], shall be used as content type of the HTTP bodies specified in the present specification, as specified in subclause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 7807 [13].

5.2.3 HTTP custom headers

5.2.3.1 General

The Nchf_SpendingLimitControl API shall support HTTP custom header fields specified in subclause 5.2.3.2 of 3GPP TS 29.500 [4].

In this Release of the specification, no specific custom headers are defined for the Nchf_SpendingLimitControl API.

5.3 Resources

5.3.1 Resource Structure

Figure 5.3.1-1 shows the resource structure of the Nchf_SpendingLimitControl API.

{apiRoot}/nchf-spendinglimitcontrol/v1

```
/subscriptions
    /{subscriptionId}
```
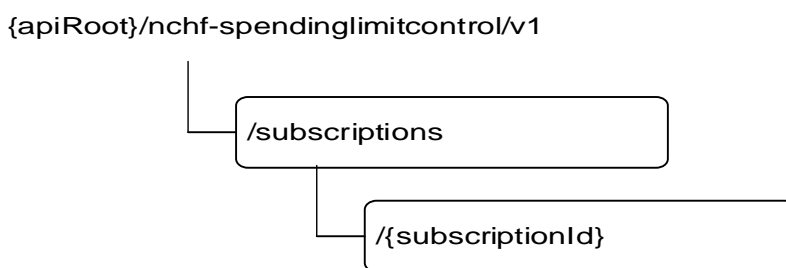
Figure 5.3.1-1: Resource URI structure of the Nchf_SpendingLimitControl API

Table 5.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
Spending Limit Retrieval Subscriptions	{apiRoot}/ nchf-spendinglimitcontrol/v1 /subscriptions	POST	Creates a new individual spending limit retrieval subscription.
Individual Spending Limit Retrieval Subscription	{apiRoot}/ nchf-spendinglimitcontrol/v1 /subscriptions/{subscriptionId}	PUT	Modifies an existing subscription (e.g. addition of additional policy counters).
		DELETE	Deletes an individual subscription.

5.3.2 Resource: Spending Limit Retrieval Subscriptions (Collection)

5.3.2.1 Description

This resource represents the collection of Nchf_SpendingLimitControl service subscriptions at a given CHF.

5.3.2.2 Resource definition

Resource URI: **{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions**

This resource shall support the resource URI variables defined in table 5.3.2.2-1.

Table 5.3.2.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 5.1

5.3.2.3 Resource Standard Methods

5.3.2.3.1 POST

This method shall support the URI query parameters specified in table 5.3.2.3.1-1.

Table 5.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.2.3.1-2 and the response data structures and response codes specified in table 5.3.2.3.1-3.

Table 5.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpendingLimitContext	M	1	Contains the information for the creation of a new individual spending limit retrieval subscription.

Table 5.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpendingLimitStatus	M	1	201 Created	The spending limit subscription was created and spending limit reports are provided.
ProblemDetails	M	1	400 Bad Request	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [4] for the POST method shall also apply.				
NOTE 2: In addition to protocol and application errors which are specified in subclause 5.2.7.2 of 3GPP TS 29.500 [4], specific errors are described in subclause 5.7.				

5.3.2.4 Resource Custom Operations

None.

5.3.3 Resource: Individual Spending Limit Retrieval Subscription (Document)

5.3.3.1 Description

This resource represents an individual Nchf_SpendingLimitControl service subscription at a given CHF.

5.3.3.2 Resource definition

Resource URI: **{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 5.3.3.2-1.

Table 5.3.3.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 5.1
subscriptionId	String identifying a subscription to the CHF spending limit control retrieval service.

5.3.3.3 Resource Standard Methods

5.3.3.3.1 PUT

This method shall support the URI query parameters specified in table 5.3.3.3.1-1.

Table 5.3.3.3.1-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.3.3.1-2 and the response data structures and response codes specified in table 5.3.3.3.1-3.

Table 5.3.3.3.1-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SpendingLimitContext	M	1	Modifies the existing individual spending limit retrieval subscription.

Table 5.3.3.3.1-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpendingLimitStatus	M	1	200 OK	Successful case: The individual spending limit subscription was modified and spending limit reports are provided.
ProblemDetails	M	1	400 Bad Request	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [4] for the PUT method shall also apply.				
NOTE 2: In addition to protocol and application errors which are specified in subclause 5.2.7.2 of 3GPP TS 29.500 [4], specific errors are described in subclause 5.7.				

5.3.3.3.2 DELETE

This method shall support the URI query parameters specified in table 5.3.3.3.2-1.

Table 5.3.3.3.3-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.3.3.2-2 and the response data structures and response codes specified in table 5.3.3.3.2-3.

Table 5.3.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The individual spending limit subscription matching the subscriptionId was deleted.
NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [4] for the DELETE method shall also apply.				

5.4 Custom Operations without associated resources

None.

5.5 Notifications

5.5.1 General

Notification shall comply with subclause 6.2 of 3GPP TS 29.500 [4] and subclause 4.6.2.3 of 3GPP TS 29.501 [5].

Table 5.5.1-1: Notifications

Custom operation URI	Mapped HTTP method	Description
{notifUri}/notify	POST	Counter Status changes notification.
{notifUri}/terminate	POST	Indication of subscription termination.

5.5.2 Spending limit notification

5.5.2.1 Description

The spending limit notification is used by the CHF to notify the change of the status of the subscribed policy counters for a subscriber and/or to provide one or more pending statuses for a subscribed policy counter together with the time they shall be applied.

5.5.2.2 Target URI

The URI **{notifUri}/notify** shall be used with the resource URI variables defined in table 5.5.2.2-1.

Table 5.5.2.2-1: Resource URI variables for this resource

Name	Definition
notifUri	String formatted as URI with the Notification Uri as assigned by the NF service consumer during the subscription service operation and described within the Nchf_SpendingLimitRequest type (see table 5.6.2.2-1).

5.5.2.3 Standard Methods

5.5.2.3.1 POST

This method shall support the URI query parameters specified in table 5.5.2.3.1-1.

Table 5.5.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.5.2.3.1-2 and the response data structures and response codes specified in table 5.5.2.3.1-3.

Table 5.5.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpendingLimitStatus	M	1	Provides information about the statuses of policy counters.

Table 5.5.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the notification is acknowledged.
NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [4] for the POST method shall also apply.				

5.5.3 Subscription Termination

5.5.3.1 Description

The Subscription Termination request is used by the CHF to request the NF service consumer the termination of the subscription to policy counter status changes.

5.5.3.2 Target URI

The Notification URI **{notifUri}/terminate** shall be used with the URI variables defined in table 5.5.3.2-1.

Table 5.5.3.2-1: URI variables

Name	Definition
notifUri	String formatted as URI with the Notification Uri as assigned by the NF service consumer during the subscription service operation and described within the Nchf_SpendingLimitRequest type (see table 5.6.2.2-1).

5.5.3.3 Standard Methods

5.5.3.3.1 POST

This method shall support the URI query parameters specified in table 5.5.3.3.1-1.

Table 5.5.3.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.5.3.3.1-2 and the response data structures and response codes specified in table 5.5.3.3.1-3.

Table 5.5.3.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SubscriptionTerminationInfo	M	1	Provides information about the deletion of the resource.

Table 5.5.3.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.

HTTP response codes shall be supported as specified in subclause 5.2.7 of 3GPP TS 29.500 [4] and as defined in subclause 5.7.

5.6 Data Model

5.6.1 General

This subclause specifies the application data model supported by the API.

Table 5.6.1-1 specifies the data types defined for the Nchf_SpendingLimitControl service based interface protocol.

Table 5.6.1-1: Nchf_SpendingLimitControl specific Data Types

Data type	Section defined	Description	Applicability
SpendingLimitContext	5.6.2.2	Describes the subscription data structure required for an individual CHF spending limit subscription.	
SpendingLimitStatus	5.6.2.3	Describes the data structure presenting the statuses of policy counters.	
PolicyCounterInfo	5.6.2.4	Describes the data structure presenting the policy counter status.	
PendingPolicyCounterStatus	5.6.2.5	Describes the data structure presenting the pending policy counter status.	
PolicyCounterId	5.6.3.2	Identifies a policy counter.	
SubscriptionTerminationInfo	5.6.2.6	Describes the data structure presenting the indication of the termination of the subscription.	
TerminationCause	5.6.3.3	Represents the types of causes for requesting the termination of the subscription.	

Table 5.6.1-2 specifies data types re-used by the Nchf_SpendingLimitControl service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nchf_SpendingLimitControl service based interface.

Table 5.6.1-2: Nchf_SpendingLimitControl re-used Data Types

Data type	Reference	Comments	Applicability
Uri	3GPP TS 29.571 [11]		
Supi	3GPP TS 29.571 [11]		
Gpsi	3GPP TS 29.571 [11]		
SupportedFeatures	3GPP TS 29.571 [11]	Used to negotiate the applicability of the optional features defined in table 5.8-1.	

5.6.2 Structured data types

5.6.2.1 Introduction

This subclause defines the structures to be used in resource representations.

5.6.2.2 Type SpendingLimitContext

Table 5.6.2.2-1: Definition of type SpendingLimitContext

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	C	0..1	The Subscription Permanent Identifier (Supi) shall be present within the initial spending limit retrieval procedure (creation of a new individual subscription).	
gpsi	Gpsi	O	0..1	The Generic Public Subscription Identifier (Gpsi) shall contain either an External Id or an MSISDN. It may be present within the initial spending limit retrieval procedure (creation of a new individual subscription).	
policyCounterIds	array(PolicyCounterId)	O	1..N	This is a list of policy counter identifier(s), which identifies policy counters maintained per subscriber within the CHF.	
notifUri	Uri	C	0..1	This attribute identifies the recipient of spending limit notifications sent to the NF service consumer by the CHF. The notifUri shall be present within the initial spending limit retrieval procedure (creation of a new individual subscription). It may be present within the intermediate spending limit retrieval procedure (modification of an existing subscription).	
supportedFeatures	SupportedFeatures	C	0..1	The list of supported features as described in subclause 5.8 shall be supplied by the NF service consumer in the POST request that request the creation of a spending limit report resource.	

5.6.2.3 Type SpendingLimitStatus

Table 5.6.2.3-1: Definition of type SpendingLimitStatus

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	O	0..1	The Subscription Permanent Identifier (Supi) shall be present within the callback notify service operation (notification of the status of subscribed policy counters).	
statusInfos	map(PolicyCounterInfo)	M	1..N	Status of the requested policy counters. The key of the map is the attribute "policyCounterId".	
supportedFeatures	SupportedFeatures	C	0..1	If the supportedFeatures is included in the request by the NF service consumer, it shall be supplied in the reply of the corresponding request by the CHF.	

5.6.2.4 Type PolicyCounterInfo

Table 5.6.2.4-1: Definition of type PolicyCounterInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
policyCounterId	PolicyCounterId	M	1	Identifies the requested policy counter.	
currentStatus	string	M	1	Identifies the policy counter status applicable for a specific policy counter identified by the policyCounterId. The values (e.g. valid, invalid or any other status) are not specified. The interpretation and actions related to the defined values are out of scope of 3GPP.	
penPolCounterStatuses	array(PendingPolicyCounterStatus)	O	1..N	Provides the pending policy counter status.	

5.6.2.5 Type PendingPolicyCounterStatus

Table 5.6.2.4-1: Definition of type PendingPolicyCounterStatus

Attribute name	Data type	P	Cardinality	Description	Applicability
policyCounterStatus	string	M	1	Identifies the policy counter status applicable for a specific policy counter identified by the PolicyCounterId. The values (e.g. valid, invalid or any other status) are not specified. The interpretation and actions related to the defined values are out of scope of 3GPP.	
activationTime	DateTime	M	1	Indicates the activation times per required policy counter.	

5.6.2.6 Type SubscriptionTerminationInfo

Table 5.6.2.6-1: Definition of type SubscriptionTerminationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	M	1	Subscription Permanent Identifier.	
termCause	TerminationCause	O	0..1	Indicates the cause for requesting the termination of the subscription to policy counter status changes.	

5.6.3 Simple data types and enumerations

5.6.3.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.6.3.2 Simple data types

The simple data types defined in table 5.6.3.2-1 shall be supported.

Table 5.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
PolicyCounterId	string	Identifies a policy counter.	

5.6.3.3 Enumeration: TerminationCause

The enumeration "TerminationCause" represents the types of causes the CHF can report when requesting the termination of the subscription.

Table 5.6.3.3-1: Enumeration TerminationCause

Enumeration value	Description	Applicability
REMOVED_SUBSCRIBER	The subscriber identified by the SUPI has been removed from the CHF.	

5.7 Error handling

5.7.1 General

HTTP error handling shall be supported as specified in subclause 5.2.4 of 3GPP TS 29.500 [4].

For the Nchf_SpendingLimitControl service API, HTTP error responses shall be supported as specified in subclause 4.8 of 3GPP TS 29.501 [5]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4]. In addition, the requirements in the following subclauses shall apply.

5.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the Nchf_SpendingLimitControl service API.

5.7.3 Application Errors

The application errors defined for the Nchf_SpendingLimitControl service API are listed in table 5.7.3-1. The CHF shall include in the HTTP status code a "ProblemDetails" data structure with the "cause" attribute indicating the application error as listed in table 5.7.3-1.

Table 5.7.3-1: Application errors

Application Error	HTTP status code	Description
USER_UNKNOWN	400 Bad Request	The subscriber specified in the request is not known at the CHF and the subscription cannot be created.
NO_AVAILABLE_POLICY_COUNTERS	400 Bad Request	There are no policy counters available for the subscriber at the CHF

5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Nchf_SpendingLimitControl Service API. They shall be negotiated using the extensibility mechanism defined in subclause 6.6 of 3GPP TS 29.500 [4].

Table 5.8-1: Supported Features

Feature number	Feature Name	Description

5.9 Security

As indicated in 3GPP TS 33.501 [14] and 3GPP TS 29.500 [4], the access to the Nchf_SpendingLimitControl API, based on local configuration, may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [15]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [16]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Nchf_SpendingLimitControl API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [16], subclause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nchf_SpendingLimitControl service.

The Nchf_SpendingLimitControl API defines a single scope "nchf-spendinglimitcontrol" for OAuth2 authorization (as specified in 3GPP TS 33.501 [14]) for the entire API, and it does not define any additional scopes at resource or operation level.

Annex A (normative): OpenAPI specification

A.1   General

The present Annex contains an OpenAPI [9] specification of HTTP messages and content bodies used by the Nchf_SpendingLimitControl Service API.

In case of conflicts between the main body of the present document and the present Annex, the information in the main body shall be applicable.

A.2   Nchf_SpendingLimitControl Service API

```
openapi: 3.0.0
info:
  description: Spending Limit Control Service API
  version: "1.0.1"
  title: Nchf_SpendingLimitControl
externalDocs:
  description: 3GPP TS 29.594 V15.2.0; 5G System; Spending Limit Control Service.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.594/'
servers:
  - url: '{apiRoot}/nchf-spendinglimitcontrol/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause subclause 4.4 of 3GPP TS 29.501
security:
  - {}
  - oAuth2ClientCredentials:
    - nchf-spendinglimitcontrol
paths:
  /subscriptions:
    post:
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SpendingLimitContext'
      responses:
        '201':
          description: Success
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpendingLimitStatus'
          headers:
            Location:
              description: 'Contains the URI of the created individual spending limit resource,
according to the structure: {apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions/{subscriptionId}'
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
```

```
                $ref: 'TS29571_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29571_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      callbacks:
        statusNotification:
          '{$request.body#/notifUri}/notify':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SpendingLimitStatus'
              responses:
                '204':
                  description: No Content, Notification was succesfull
                '400':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/default'
        subscriptionTermination:
          '{$request.body#/notifUri}/terminate':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SubscriptionTerminationInfo'
              responses:
                '204':
                  description: No Content, Notification was succesfull
                '400':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /subscriptions/{subscriptionId}:
    parameters:
      - in: path
        name: subscriptionId
```

```
                description: Identifies an individual spending limit retrieval subscription.
                required: true
                schema:
                  type: string
      put:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpendingLimitContext'
        responses:
          '200':
            description: OK. Resource was succesfully modified and representation is returned
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/SpendingLimitStatus'
          '400':
            $ref: 'TS29571_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29571_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29571_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          '411':
            $ref: 'TS29571_CommonData.yaml#/components/responses/411'
          '413':
            $ref: 'TS29571_CommonData.yaml#/components/responses/413'
          '415':
            $ref: 'TS29571_CommonData.yaml#/components/responses/415'
          '429':
            $ref: 'TS29571_CommonData.yaml#/components/responses/429'
          '500':
            $ref: 'TS29571_CommonData.yaml#/components/responses/500'
          '503':
            $ref: 'TS29571_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      delete:
        responses:
          '204':
            description: No Content. Resource was succesfully deleted
          '400':
            $ref: 'TS29571_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29571_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29571_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          '429':
            $ref: 'TS29571_CommonData.yaml#/components/responses/429'
          '500':
            $ref: 'TS29571_CommonData.yaml#/components/responses/500'
          '503':
            $ref: 'TS29571_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29571_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nchf-spendinglimitcontrol: Access to the Nchf_SpendingLimitControl API
  schemas:
    SpendingLimitContext:
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        policyCounterIds:
```

```
              type: array
              items:
                $ref: '#/components/schemas/PolicyCounterId'
              minItems: 1
              description: This is a list of policy counter identifier(s), which identifies policy
counters maintained per subscriber within the CHF.
            notifUri:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
            supportedFeatures:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      SpendingLimitStatus:
        type: object
        properties:
          supi:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
          statusInfos:
            type: object
            additionalProperties:
              $ref: '#/components/schemas/PolicyCounterInfo'
            minProperties: 1
            description: Status of the requested policy counters. The key of the map is the attribute
"policyCounterId".
          supportedFeatures:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        required:
          - statusInfos
      PolicyCounterInfo:
        type: object
        properties:
          policyCounterId:
            $ref: '#/components/schemas/PolicyCounterId'
          currentStatus:
            type: string
            description: Identifies the policy counter status applicable for a specific policy counter
identified by the policyCounterId. The values (e.g. valid, invalid or any other status) are not
specified. The interpretation and actions related to the defined values are out of scope of 3GPP.
          penPolCounterStatuses:
            type: array
            items:
              $ref: '#/components/schemas/PendingPolicyCounterStatus'
            minItems: 1
            description: Provides the pending policy counter status.
        required:
          - policyCounterId
          - currentStatus
      PendingPolicyCounterStatus:
        type: object
        properties:
          policyCounterStatus:
            type: string
            description: Identifies the policy counter status applicable for a specific policy counter
identified by the policyCounterId. The values (e.g. valid, invalid or any other status) are not
specified. The interpretation and actions related to the defined values are out of scope of 3GPP.
          activationTime:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        required:
          - policyCounterStatus
          - activationTime
      PolicyCounterId:
        type: string
        description: Identifies a policy counter.
      SubscriptionTerminationInfo:
        type: object
        properties:
          supi:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
          termCause:
            $ref: '#/components/schemas/TerminationCause'
        required:
          - supi
      TerminationCause:
        anyOf:
        - type: string
          enum:
            - REMOVED_SUBSCRIBER
        - type: string
```

Annex B (informative):
Change history

Date	TSG #	TSG Doc.	CR	Rev	Cat	Subject/Comment	New
2018-04						TS skeleton of Spending Limit Control Service specification	0.0.0
2018-04	CT3#96					Inclusion of documents agreed in CT3#96: C3-182160, C3-182161, C3-182167, C3-182432, C3-182433, C3-182434, C3-182435, C3-182436, C3-182437, C3-182479	0.1.0
2018-05	CT3#97					Inclusion of documents agreed in CT3#97: C3-183138, C3-183288, C3-183538, C3-183539, C3-183541, C3-183543, C3-183544, C3-183545, C3-183546, C3-183547, C3-183548, C3-183550, C3-183552, C3-183780, C3-183782, C3-183830, C3-183831	0.2.0
2018-06	CT#80	CP-181026				TS sent for approval to TSG	1.0.0
2018-06	CT#80	CP-181026				TS approved by plenary	15.0.0
2018-09	CT#81	CP-182015	0001	1	F	Removal of possibility of confusion related to 3GPP TS 29.513, custom headers, verbal forms and OpenAPI corrections	15.1.0
2018-09	CT#81	CP-182221	0002	4	F	Introduction of the simple data type "policyCounterId"	15.1.0
2018-09	CT#81	CP-182098	0003	3	F	Update and corrections of the data model	15.1.0
2018-09	CT#81	CP-182015	0004	2	F	Integration of error handling	15.1.0
2018-09	CT#81	CP-182015	0007	-	F	ED – Continuous reporting and policy counter status change	15.1.0
2018-09	CT#81	CP-182099	0008	3	F	Termination of the subscription of status changes for all policy counters by CHF	15.1.0
2018-12	CT#82	CP-183205	0009	-	F	Application of resource illustration rule	15.2.0
2018-12	CT#82	CP-183205	0010	-	F	Consolidation of the term "notificationUri"	15.2.0
2018-12	CT#82	CP-183205	0011	-	F	Clarification of "intermediate spending limit report retrieval" usage	15.2.0
2018-12	CT#82	CP-183205	0012	-	F	Correction of wrong reference for supi in OpenAPI doc	15.2.0
2018-12	CT#82	CP-183205	0013	-	F	Correction of the originator for application error responses	15.2.0
2018-12	CT#82	CP-183205	0014	1	F	Application of externalDocs field in OpenAPI doc	15.2.0
2018-12	CT#82	CP-183205	0015	1	F	Application of version pattern rule in OpenAPI doc	15.2.0
2018-12	CT#82	CP-183205	0016	1	F	Corrections to OpenAPI file	15.2.0
2018-12	CT#82	CP-183205	0017	-	F	Default value for apiRoot	15.2.0
2018-12	CT#82	CP-183205	0018	-	F	Cardinality	15.2.0
2018-12	CT#82	CP-183205	0019	2	F	Sending of GPSI (MSISDN) in Initial Spenidng Limit retrieval	15.2.0
2018-12	CT#82	CP-183205	0020	1	F	Update of content types	15.2.0
2018-12	CT#82	CP-183205	0021	1	F	Authorization of NF service access by OAuth 2.0	15.2.0
2018-12	CT#82	CP-183205	0022	1	F	Introduction of status code 404 Not Found as mandatory status code and missing ones	15.2.0
2018-12	CT#82	CP-183205	0023	1	F	Location Header	15.2.0
2018-12	CT#82	CP-183205	0024	2	F	Correcting application error	15.2.0
2019-03	CT#83	CP-190113	0025	1	F	Correction of Resource URI	15.3.0
2019-03	CT#83	CP-190113	0026	1	F	Correction relating to the introduction of the General Public Subscription Identifier	15.3.0

| 2019-03 | CT#83 | CP-190068 | 0027 | 2 | F | OpenAPI info version update | 15.3.0 |
| 2019-03 | CT#83 | CP-190067 | 0028 | - | F | Correction of wrong usage of key word "items" | 15.3.0 |

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History

Document history		
V15.0.0	July 2018	Publication
V15.1.0	October 2018	Publication
V15.2.0	April 2019	Publication
V15.3.0	April 2019	Publication