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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 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.
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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".

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
NF	Network Function
PCF	Policy Control 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 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.

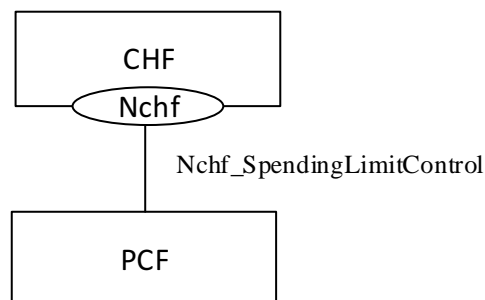


Figure 4.1.2-1: Nchf_SpendingLimitContol service architecture, SBI representation

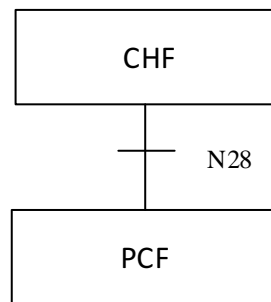


Figure 4.1.2-2: Nchf_SpendingLimitControl service architecture, reference point representation

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 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.	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).

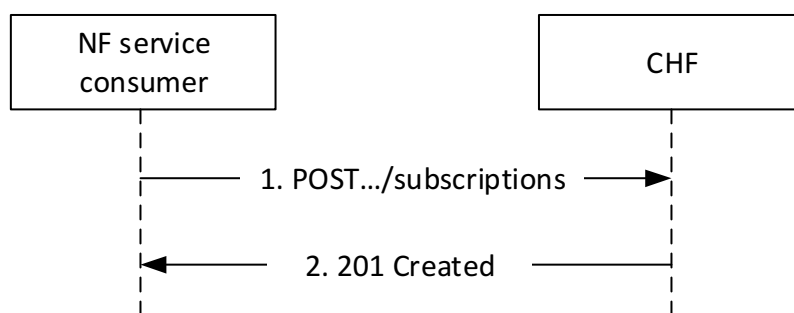


Figure 4.2.2.2-1: NF service consumer subscribes to retrieve policy counter status and spending limit reporting

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 subscriber Id; and the
- notification correlation target address.

The data structure provided in the request body may include:

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

If the CHF cannot successfully fulfil the received HTTP POST request due to the 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.

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.

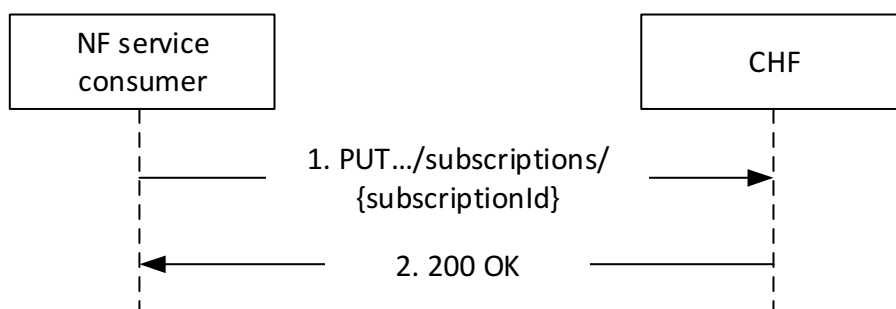


Figure 4.2.2.3-1: NF service consumer modifies the subscription to retrieve policy counter status and spending limit reporting

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 created 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.

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).

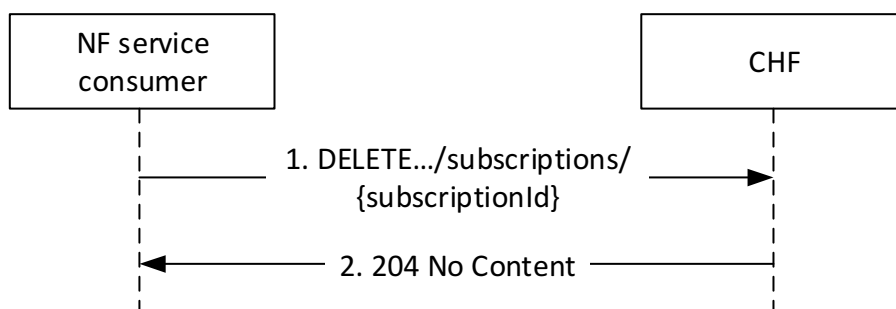


Figure 4.2.3.2-1: NF service consumer unsubscribes from spending limit reporting

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.

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).

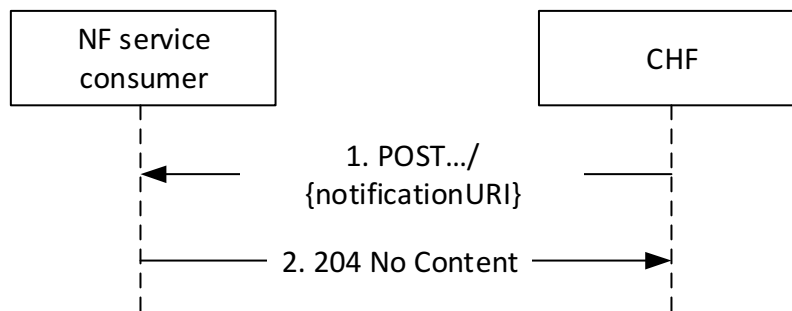


Figure 4.2.4.2-1: Spending limit reporting

The CHF shall send an HTTP POST request to the resource notification target address (notificationURI) of the NF service consumer received in the subscription creation or modification.

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.

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].

5.2.3 HTTP custom headers

5.2.3.1 General

This subclause will list, if applicable, the possible reused HTTP custom headers and the definition of new HTTP custom headers introduced by this specification.

5.3 Resources

5.3.1 Resource Structure

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

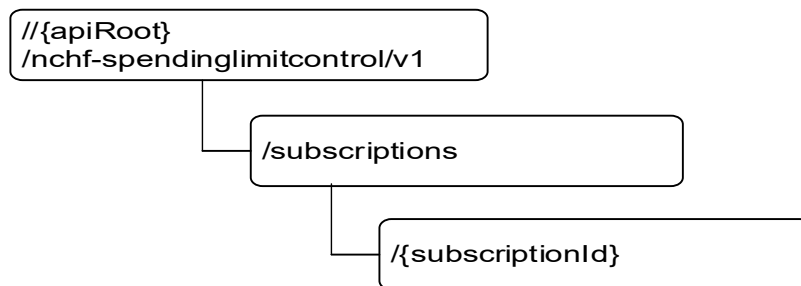


Figure 5.3.1-1: Resource URI structure of the Nchf_SpendingLimitControl API

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.

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.

5.3.2.4 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 formatted as defined for the subscriptionId type in table 5.6.3.2-1.

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.

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.

5.3.3.3.2 DELETE

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

Table 5.3.3.3.2-1: 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.

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.

5.4 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].

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 must be applied.

5.5.2.2 Target URI

The URI {notificationURI} 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
notificationUri	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.

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.	

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]		
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	Subscription Permanent Identifier. The Supi is mandatory for initial spending limit retrieval.	
policyCounterIds	array(policyCounterId)	O	0..N	This is a list of policy counter identifier(s), which identifies policy counters maintained per subscriber within the CHF.	
notificationUri	Uri	C	0..1	This attribute identifies the recipient of spending limit notifications sent to the NF service consumer by the CHF. The notificationURI is mandatory for initial spending limit retrieval.	
supportedFeatures	SupportedFeatures	C	0..1	List of supported features as described in subclause 5.8. This parameter shall be supplied by the NF service consumer in the POST request that request the creation of a spending limit report resource and shall be supplied by the CHF in the reply of the corresponding request.	

Editor's note: The parameters continuous reporting and the event Id "policy counter status change" are for FFS.

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	Subscription Permanent Identifier. The Supi is only mandatory for the notify service operation.	
statusInfos	map(PolicyCounterInfo)	M	1..N	Status of the requested policy counters. The key of the map is the attribute "policyCounterId".	

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	string	M	1	Identifies the requested policy counter.	
currentStatus	string	M	0..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	0..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	

5.6.3 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
subscriptionId	string	Identifies an individual spending limit retrieval subscription. The type allows that the value is used as part of an URI. The string shall contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [2]. In an OpenAPI [9] schema, the format shall be defined as "subscriptionId".	

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 [2]. 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 PCF 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

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

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: "1.0.0"
  title: Nchf_SpendingLimitControl
externalDocs:
  description: "3GPP TS 29.594 V0.2.0, 5G System; Spending Limit Control Service "
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.594/'
servers:
- url: https://{apiRoot}/nchf-spendinglimitcontrol/v1
  variables:
    apiRoot:
      default: demohost.com
      description: apiRoot as defined in subclause subclause 4.4 of 3GPP TS 29.501, excluding the
http:// part
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'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
    callbacks:
      myNotification:
        '{$request.body#/notificationURI}':
          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'
              '500':
                $ref: 'TS29571_CommonData.yaml#/components/responses/500'
              default:
                $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /subscriptions/{subscriptionId}:
    parameters:

```

```

- in: path
  name: subscriptionId
  required: true
  schema:
    $ref: '#/components/schemas/subscriptionId'
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'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  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'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'
components:
  schemas:
    SpendingLimitContext:
      type: object
      properties:
        supi:
          $ref: 'TS29.571_CommonData.yaml#/components/schemas/Supi'
        policyCounterIds:
          type: array
          items:
            $ref: '#/components/schemas/policyCounterId'
          minItems: 0
          description: This is a list of policy counter identifier(s), which identifies policy
counters maintained per subscriber within the CHF.
        notificationUri:
          $ref: 'TS29.571_CommonData.yaml#/components/schemas/Uri'
        supportedFeatures:
          $ref: 'TS29.571_CommonData.yaml#/components/schemas/SupportedFeatures'
    SpendingLimitStatus:
      type: object
      properties:
        supi:
          $ref: 'TS29.571_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".
        required:
          - statusInfos
    PolicyCounterInfo:
      type: object
      properties:
        policyCounterId:
          type: string
          description: Identifies the requested policy counter.
        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: 0
  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: 'TS29.571_CommonData.yaml#/components/schemas/DateTime'
  required:
    - policyCounterStatus
    - activationTime
subscriptionId:
  type: string
  description: Identifies an individual spending limit retrieval subscription. The type allows
that the value is used as part of an URI. The string shall contain characters allowed according to
the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [2]. In an OpenAPI [9] schema,
the format shall be defined as "subscriptionId".
```

Editor's note: It is for FFS to add further error codes.

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

History

Document history		
V15.0.0	July 2018	Publication