ETSI TS 129 594 V16.5.0 (2021-04)

TECHNICAL SPECIFICATION

5G;
5G System;
Spending Limit Control Service;
Stage 3
(3GPP TS 29.594 version 16.5.0 Release 16)

ETSI

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

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

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.
No recommendation as to products and services or vendors is made or should be implied.
No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.
In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

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

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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

1 Scope

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

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

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

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

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

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]		3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

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

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

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

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

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

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

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

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

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

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

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

[13]		IETF RFC 7807: "Problem Details for HTTP APIs".

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

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

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

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

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

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

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Nchf: Service-based interface exhibited by Charging Function.

3.2   Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

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

4   Nchf_SpendingLimitControl Service

4.1   Service Description

4.1.1   Overview

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

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

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

Nchf_SpendingLimitControl Service applies to the cases where the PCF interacts with the CHF in the non-roaming scenario, and the H-PCF interacts with the H-CHF in the home-routed scenario.

4.1.2 Service Architecture

The Nchf_SpendingLimitControl service is provided by the CHF and consumed by the PCF, as shown in figure 4.1.2-1 for the SBI representation model and in figure 4.1.2-2 for the reference point representation model.
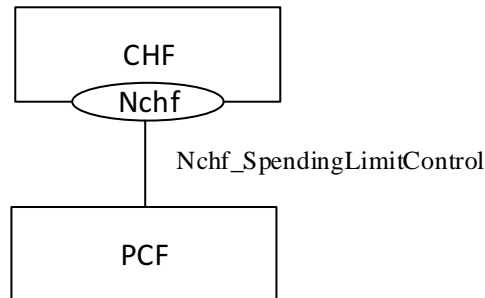
Figure 4.1.2-1: Nchf_SpendingLimitControl service architecture, SBI representation
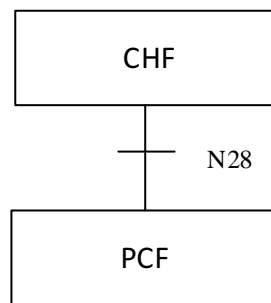
Figure 4.1.2-2: Nchf_SpendingLimitControl service architecture, reference point representation

4.1.3 Network Functions

4.1.3.1 Charging Function (CHF)

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

4.1.3.2 NF Service Consumers

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

4.2 Service Operations

4.2.1 Introduction

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

Table 4.2.1-1: Nchf_SpendingLimitControl Service Operations

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

4.2.2 Nchf_SpendingLimitControl_Subscribe service operation

4.2.2.1 General

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

- initial spending limit retrieval; and

- intermediate spending limit report retrieval.

4.2.2.2 Initial spending limit retrieval

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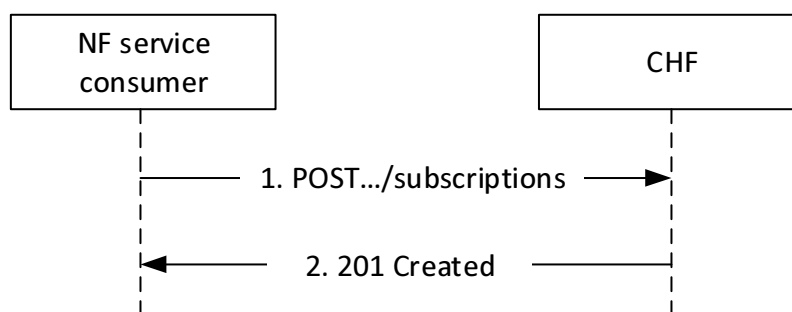
Figure 4.2.2.2-1: NF service consumer subscribes to retrieve policy counter status and spending limit reporting

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

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

- the Subscription Permanent Identifier (SUPI) encoded in the "supi" attribute;

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

- If the feature "NotificationCorrelation" is supported, a Notification Correlation Identifier assigned by the NF service consumer for the requested notifications encoded in the "notifId" attribute, if the "notifUri" does not encode within the provided URI the notification correlation Id.

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

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

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

- Event Filter information "list of policy counter identifier(s)" encoded in the "policyCounterIds" attribute. The "policyCounterIds" attribute shall contain the list of policy counter identifiers to be subscribed to. If the "policyCounterIds" attribute is omitted, the subscription is to all available policy counters; and

- when the feature "SubscriptionExpirationTimeControl" is supported by the NF service consumer, the NF service consumer may include an expiry time encoded in the "expiry" attribute, representing the time up to which the subscription is desired to be kept active. When the "expiry" attribute is omitted in the request, it represents the NF service consumer does not have any time constraint in the duration of the subscription.

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

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

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

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

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

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

- assign a subscriptionId; and

- store the subscription resource.

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

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

- the policy counter identifier in the "policyCounterId" attribute; and

- the policy counter status in the "currentStatus" attribute.

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

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

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

When the feature "SubscriptionExpirationTimeControl" is supported, the CHF may include the "expiry" attribute, representing the time up to which the subscription shall be kept active. If an expiry time was included in the subscription request, then the expiry time shall be returned in the response, and the value shall be less than or equal to the requested value. When the "expiry" attribute is omitted in the request and in the response, it represents neither the CHF or the NF service consumer have time constrains in the duration of the subscription and shall be kept active till the explicit subscription termination as described in subclause 4.2.3.2 and subclause 4.2.4.3.

NOTE 1: If the NF Service Consumer does not include a expiry time in the request, the CHF can include a expiry time in the response that represents the time after which the subscription becomes invalid.

NOTE 2: Once the subscription expires, if the NF service consumer wants to keep receiving notifications, it needs to create a new subscription in the CHF, as specified in this subclause.

4.2.2.3 Intermediate spending limit report retrieval

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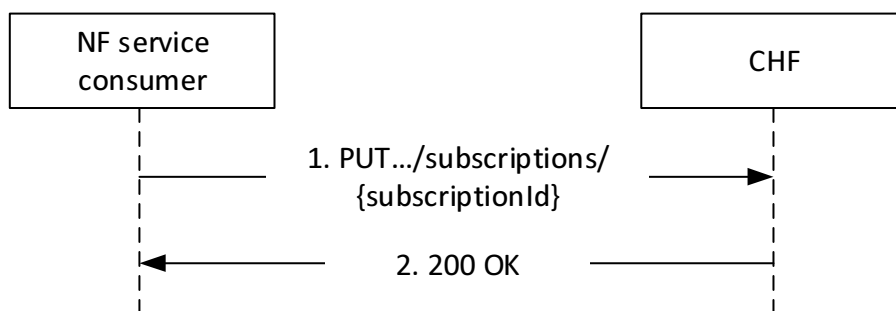
Figure 4.2.2.3-1: NF service consumer modifies the subscription to retrieve policy counter status and spending limit reporting

The NF service consumer shall send an HTTP PUT request to the resource "{apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions/{subscriptionId}" representing an existing "Individual Spending Limit Subscription" resource, as shown in figure 4.2.2.3-1, step 1, to modify the subscription for retrieval of the policy counter status and spending limit reporting.

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

- shall include the Subscription Permanent Identifier (SUPI) encoded in the "supi" attribute;

- shall include the notification correlation target address encoded in the "notifUri" attribute;

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

- if the General Public Subscription Identifier (GPSI) was provided within the initial spending limit retrieval procedure, described in subclause 4.2.2.2, shall include the GPSI encoded in the "gpsi" attribute; and

- may include Event Filter information as a "list of policy counter identifier(s)" encoded in the "policyCounterIds" attribute. The "policyCounterIds" attribute shall contain the updated list of policy counter identifiers to be subscribed to. If the "policyCounterIds" attribute is omitted, the subscription is updated to all available policy counters; and

- when the feature "SubscriptionExpirationTimeControl" is supported, may include an expiry time encoded in the "expiry" attribute to update the duration of the subscription, representing the updated time up to which the subscription is desired to be kept active. When the "expiry" attribute is omitted in the request, the subscription shall be considered valid without an expiry time.

NOTE 2: The "notifUri" attribute within the SpendingLimitContext data structure can be modified to request that subsequent notifications are sent to a new NF service consumer.

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

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

The SpendingLimitStatus data structure provided in the response body, when the feature "SubscriptionExpirationTimeControl" is not supported, shall include the status of the requested subscribed policy counters in the "statusInfos" map, where every PolicyCounterInfo entry shall contain:

- the policy counter identifier in the "policyCounterId" attribute; and

- the policy counter status in the "currentStatus" attribute.

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

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

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

When the feature "SubscriptionExpirationTimeControl" is supported, the CHF may include the "expiry" attribute, representing the time up to which the subscription shall be kept active. If an expiry time was included in the subscription update request, then the expiry time shall be returned in the response, and the value returned should be less than or equal to the value in the request. When the "expiry" attribute is omitted in the request and in the response, it represents that the previously agreed duration of the subscription remains valid.

NOTE 3: When the NF service consumer does not include a expiry time in the request, the CHF can include a expiry time in the response that represents an update of the previously provided duration of the subscription.

NOTE 4: Once the subscription expires, if the NF service consumer wants to keep receiving notifications, it needs to create a new subscription in the CHF, as specified in subclause 4.2.2.2.

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 or, if the feature "ES3XX" is supported, an HTTP redirect response to the NF service consumer as specified in subclause 5.7.

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

If one or more policy counters specified in the PUT request in the "policyCounterIds" attribute are unknown to the CHF, and the CHF is configured to reject request, the CHF shall indicate in an HTTP "400 Bad Request" response the cause for the rejection with the "cause" attribute set to "UNKNOWN_POLICY_COUNTERS" and the unknown policy counter identifiers within the "invalidParams" attribute. The PUT request shall not take effect, and the CHF shall maintain the Individual Spending Limit Retrieval resource.

NOTE 5: In order to avoid misbehaviors due to the policy counters status maintained in the CHF and the NF service consumer, the NF service consumer can terminate the subscription invoking the Nchf_SpendingLimitControl_Unsubscribe service operation in subclause 4.2.3.2.

NOTE 6: The NF service consumer can terminate the subscription invoking the Nchf_SpendingLimitControl_Unsubscribe service operation in subclause 4.2.3.2, or maintain subscription assuming that further available policy counters will be notified.

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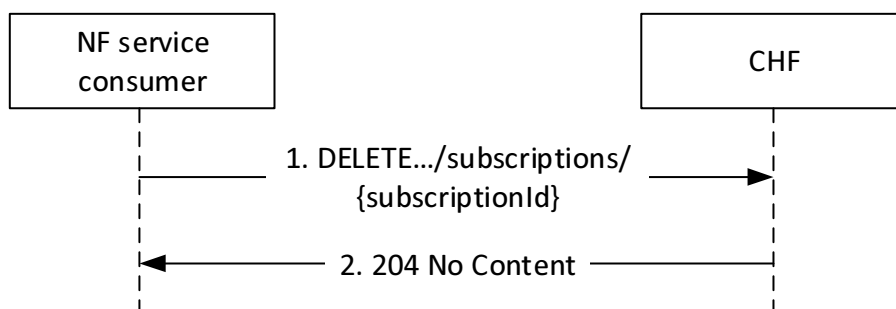
Figure 4.2.3.2-1: NF service consumer unsubscribes from spending limit reporting

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 (e.g. the HTTP DELETE request is for a non-existent subscription), it shall indicate the appropriate cause for the rejection in the HTTP response code or, if the feature "ES3XX" is supported, an HTTP redirect response 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).

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).
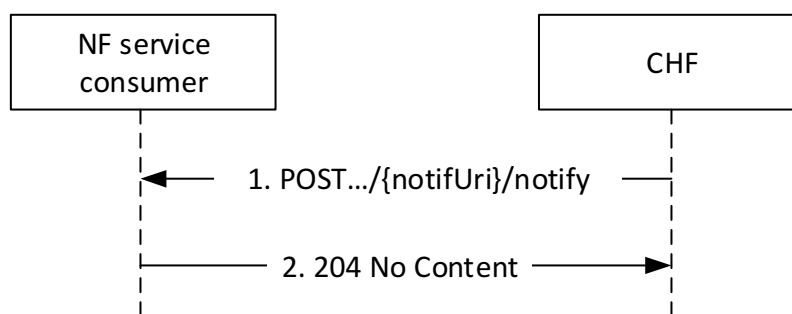
Figure 4.2.4.2-1: Spending limit reporting

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 SpendingLimitStatus data structure provided in the request body shall include:

- Subscriber Identity in the "supi" attribute;

- if the feature "NotificationCorrelation" is supported, the notification correlation ID in the "notifId" attribute if received in the SpendingLimitContext data structure provided in the creation of the subscription; and

- when the feature "SubscriptionExpirationTimeControl" is not supported, Policy counters status in the "statusInfos" map, where every PolicyCounterInfo entry shall include:

  a. the "policyCounterId" attribute with the policy counter identifier; and

  b. the "currentStatus" attribute with the new policy counter status when the notification is triggered by a change in the policy counter status, or the current policy counter status when the notification is triggered by a change in the pending policy counter status(es).

  NOTE 1: When the feature "SubscriptionExpirationTimeControl" is supported, the CHF may include the update of the expiry time, and if at this time there is no change of policy counter status, the CHF may not include the "statusInfos" attribute.

When a policy counter identifier is no longer applicable to the subscriber (e.g. becomes not provisioned), but still exists in the Individual Spending Control Retrieval resource, the CHF may include it in the "statusInfos" map, and set the "currentStatus" attribute to an operator configured policy counter status to indicate this to the NF service consumer.

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

When the feature "SubscriptionExpirationTimeControl" is supported, the CHF may include the "expiry" attribute, representing an update in the time up to which the subscription shall be kept active. When the "expiry" attribute is omitted, it represents that the previously agreed duration of the subscription remains valid.

> NOTE 2: Once the subscription expires, if the NF Service Consumer wants to keep receiving notifications, it needs to create a new subscription in the CHF, as specified in subclause 4.2.2.2.

The CHF shall not send the policy counter status for the same policy counter until it received the response of the previous status report of the policy counter.

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 or, if the feature "ES3XX" is supported, an HTTP redirect response to the CHF as specified in subclause 5.7.

If the NF service consumer receives an HTTP POST notification request message for an intermediate spending limit report transaction from the CHF in which no pending policy counter statuses and their activation times are included for a policy counter, i.e., the "penPolCounterStatuses" attribute is not included, the NF service consumer shall cancel all previously provided pending policy counter statuses and their activation times for this policy counter. If the NF service consumer receives an HTTP POST notification request message for an intermediate spending limit report transaction from the CHF containing pending policy counter statuses and their activation times for a previously provided policy counter, the NF service consumer shall replace the existing pending policy counter statuses and their activation times if any.

If the NF service consumer receives an HTTP POST request for spending limit report initiated by the CHF while it has an ongoing intermediate spending limit report retrieval transaction with the CHF, the NF service consumer shall update the policy counter information based on the HTTP POST request for spending limit report. When the corresponding response for the ongoing intermediate spending limit report retrieval transaction is eventually received, the NF service consumer shall only update policy counter information for counters that were not provided in the previously received HTTP POST request for spending limit report.

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.
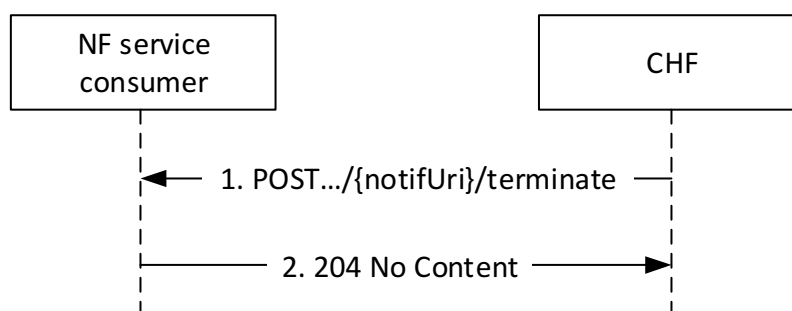
Figure 4.2.4.3-1: Subscription termination request by CHF

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 and the removal of the Individual Spending Limit Retrieval Subscription resource to the NF service consumer.

The SubscriptionTerminationInfo data structure provided in the request body shall include the subscriber identification encoded in the "supi" attribute and may include subscription termination information in the "termCause" attribute.

When the termination request is because the subscriber identified by the SUPI has been removed from the CHF, the CHF shall set the "termCause" attribute to "REMOVED_SUBSCRIBER".

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 or, if the feature "ES3XX" is supported, an HTTP redirect response to the CHF as specified in subclause 5.7.

5 Nchf_SpendingLimitControl Service API

5.1 Introduction

The Nchf_SpendingLimitControl service shall use the Nchf_SpendingLimitControl API.

The API URI of the Nchf_SpendingLimitControl API shall be:

    {apiRoot}/<apiName>/<apiVersion>/

The request URIs used in HTTP requests from the NF service consumer towards the CHF shall have the Resource URI 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}
```
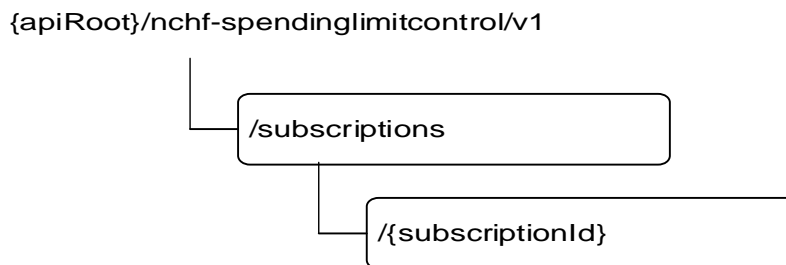
Figure 5.3.1-1: Resource URI structure of the Nchf_SpendingLimitControl API

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	/subscriptions	POST	Creates a new individual spending limit retrieval subscription.
Individual Spending Limit Retrieval Subscription	/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	Data type	Definition
apiRoot	string	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	O	0..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.				

Table 5.3.2.3.1-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nchf-spendinglimitcontrol/v1/subscriptions/{subscriptionId}

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	Data type	Definition
apiRoot	string	See subclause 5.1
subscriptionId	string	Identifies 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	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual Spending Limit Retrieval Subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative CHF (service) instance. Applicable if the feature "ES3XX" is supported.
ProblemDetails	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual Spending Limit Retrieval Subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative CHF (service) instance. Applicable if the feature "ES3XX" is supported.
ProblemDetails	O	0..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.				

Table 5.3.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative CHF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

Table 5.3.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative CHF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

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.
ProblemDetails	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual Spending Limit Retrieval Subscription deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative CHF (service) instance. Applicable if the feature "ES3XX" is supported.
ProblemDetails	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual Spending Limit Retrieval Subscription deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative CHF (service) instance. Applicable if the feature "ES3XX" is supported.
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.				

Table 5.3.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative CHF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

Table 5.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative CHF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

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 overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Spending limit notification	{notifUri}/notify	notify (POST)	Counter Status changes notification.
Subscription Termination	{notifUri}/terminate	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 Callback URI **{notifUri}/notify** shall be used with the callback URI variables defined in table 5.5.2.2-1.

Table 5.5.2.2-1: Callback URI variables

Name	Data type	Definition
notifUri	Uri	The Notification Uri as assigned by the NF service consumer during the subscription service operation and described within the SpendingLimitContext data 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.
ProblemDetails	O	0..1	307 Temporary Redirect	Temporary redirection, during Spending limit report. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent. Applicable if the feature "ES3XX" is supported.
ProblemDetails	O	0..1	308 Permanent Redirect	Permanent redirection, during Spending limit report. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent. Applicable if the feature "ES3XX" is supported.
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.			

Table 5.3.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected

Table 5.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected

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

Table 5.5.3.2-1: Callback URI variables

Name	Data type	Definition
notifUri	Uri	The Notification Uri as assigned by the NF service consumer during the subscription service operation and described within the SpendingLimitContext data 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.
ProblemDetails	O	0..1	307 Temporary Redirect	Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent. Applicable if the feature "ES3XX" is supported.
ProblemDetails	O	0..1	308 Permanent Redirect	Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent. Applicable if the feature "ES3XX" is supported.
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.				

Table 5.5.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected

Table 5.5.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected

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
DateTime	3GPP TS 29.571 [11]	String with format "date-time" as defined in OpenAPI Specification [9].	
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) and intermediate spending limit retrieval procedure (modification of an existing 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) and intermediate spending limit retrieval procedure (modification of an existing 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 and within the intermediate spending limit retrieval procedure (modification of an existing subscription).	
notifId	string	C	0..1	Notification Correlation ID assigned by the NF service consumer. It shall be included if the NotificationCorrelation feature is supported, the notifUri does not encode the notification correlation Id, and the PCF(s) requires multiple subscriptions for the same SUPI, e.g. UE accesses multiple network slices.	NotificationCorrelation
expiry	DateTime	O	0..1	The expiry time may be included in a subscription request. When present, this IE shall represent the longest duration time after which the subscription shall become invalid.	SubscriptionExpirationTimeControl

| 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 and intermediate spending limit retrieval procedure (modification of an existing subscription). | |

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).	
notifId	string	C	0..1	Notification Correlation ID assigned by the NF service consumer. It shall be included if provided during the subscription within the SpendingLimitContext data type.	NotificationCorrelation
statusInfos	map(PolicyCounterInfo)	C	1..N	Status of the requested policy counters. The key of the map is the attribute "policyCounterId". It may be omitted when the feature SubscriptionExpirationTimeControl is supported and the CHF only requires to update the "expiry" attribute.	
expiry	DateTime	C	0..1	This expiry time shall be included in a subscription response, if the expiry time was included in the request. It may be included in a subscription response and notification request based on operator policies for the control in the CHF of the subscription duration.	SubscriptionExpirationTimeControl
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 5.6.2.5-1: 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 time at which the pending policy counter status becomes the current status of a 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].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] for HTTP redirections shall be supported if the feature "ES3XX" is supported.

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
UNKNOWN_POLICY_COUNTERS	400 Bad Request	The policy counter identifiers in the request are not known 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 6.6.2 of 3GPP TS 29.500 [4].

Table 5.8-1: Supported Features

Feature number	Feature Name	Description
1	SubscriptionExpirationTime Control	Indicates the support of a expiry time to control the time duration of the subscription to changes of policy counters status.
2	NotifiationCorrelation	Indicates the support of the explicit indication of the notification correlation id
3	ES3XX	Extended Support for 3xx redirections. This feature indicates the support of redirection for any service operation, according to Stateless NF procedures as specified in subclauses 6.5.3.2 and 6.5.3.3 of 3GPP TS 29.500 [4] and according to HTTP redirection principles for indirect communication, as specified in subclause 6.10.9 of 3GPP TS 29.500 [4].

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.

This Annex shall take precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API.

> NOTE: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification file contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [17] and subclause 5.3.1 of the 3GPP TS 29.501 [5] for further information).

A.2 Nchf_SpendingLimitControl Service API

```
openapi: 3.0.0
info:
  version: 1.1.2
  title: Nchf_SpendingLimitControl
  description: |
    Nchf Spending Limit Control Service.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.594 V16.5.0; 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
                '307':
                  description: Temporary Redirect
                  content:
                    application/problem+json:
                      schema:
                        $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
                  headers:
                    Location:
                      required: true
                      description: 'A URI pointing to the endpoint of an alternative NF consumer
(service) instance towards which the notification should be redirected.'
                      schema:
                        type: string
                    3gpp-Sbi-Target-Nf-Id:
                      description: 'Identifier of the target NF (service) instance towards which the
notification request is redirected'
                      schema:
                        type: string
                '308':
                  description: Permanent Redirect
                  content:
                    application/problem+json:
                      schema:
                        $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
                  headers:
                    Location:
                      required: true
                      description: 'A URI pointing to the endpoint of an alternative NF consumer
(service) instance towards which the notification should be redirected.'
                      schema:
                        type: string
                    3gpp-Sbi-Target-Nf-Id:
                      description: 'Identifier of the target NF (service) instance towards which the
notification request is redirected'
                      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:
                      $ref: 'TS29571_CommonData.yaml#/components/responses/default'
          subscriptionTermination:
            '{$request.body#/notifUri}/terminate':
              post:
                requestBody:
                  required: true
                  content:
                    application/json:
                      schema:
                        $ref: '#/components/schemas/SubscriptionTerminationInfo'
                responses:
                  '204':
                    description: No Content, Notification was succesfull
                  '307':
                    description: Temporary Redirect
                    content:
                      application/problem+json:
                        schema:
                          $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
                    headers:
                      Location:
                        required: true
                        description: 'A URI pointing to the endpoint of an alternative NF consumer
(service) instance towards which the notification should be redirected.'
                        schema:
                          type: string
                      3gpp-Sbi-Target-Nf-Id:
                        description: 'Identifier of the target NF (service) instance towards which the
notification request is redirected'
                        schema:
                          type: string
                  '308':
                    description: Permanent Redirect
                    content:
                      application/problem+json:
                        schema:
                          $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
                    headers:
                      Location:
                        required: true
                        description: 'A URI pointing to the endpoint of an alternative NF consumer
(service) instance towards which the notification should be redirected.'
                        schema:
                          type: string
                      3gpp-Sbi-Target-Nf-Id:
                        description: 'Identifier of the target NF (service) instance towards which the
notification request is redirected'
                        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'
    /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'
          '307':
            description: Temporary Redirect
            content:
              application/problem+json:
                schema:
                  $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
            headers:
              Location:
                description: 'An alternative URI of the resource located on an alternative CHF
(service) instance.'
                required: true
                schema:
                  type: string
              3gpp-Sbi-Target-Nf-Id:
                description: 'Identifier of the target NF (service) instance towards which the request
is redirected'
                schema:
                  type: string
          '308':
            description: Permanent Redirect
            content:
              application/problem+json:
                schema:
                  $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
            headers:
              Location:
                description: 'An alternative URI of the resource located on an alternative CHF
(service) instance.'
                required: true
                schema:
                  type: string
              3gpp-Sbi-Target-Nf-Id:
                description: 'Identifier of the target NF (service) instance towards which the request
is redirected'
                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':
```

```yaml
              $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
          '307':
            description: Temporary Redirect
            content:
              application/problem+json:
                schema:
                  $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
            headers:
              Location:
                description: 'An alternative URI of the resource located on an alternative CHF
(service) instance.'
                required: true
                schema:
                  type: string
              3gpp-Sbi-Target-Nf-Id:
                description: 'Identifier of the target NF (service) instance towards which the request
is redirected'
                schema:
                  type: string
          '308':
            description: Permanent Redirect
            content:
              application/problem+json:
                schema:
                  $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
            headers:
              Location:
                description: 'An alternative URI of the resource located on an alternative CHF
(service) instance.'
                required: true
                schema:
                  type: string
              3gpp-Sbi-Target-Nf-Id:
                description: 'Identifier of the target NF (service) instance towards which the request
is redirected'
                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'
          '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'
        expiry:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        notifId:
          type: string
    SpendingLimitStatus:
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        notifId:
          type: string
        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".
        expiry:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    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 (normative):
5GC and EPC interworking scenario support

B.1 Scope

This annex defines procedures for the Nchf_SpendingLimitControl service for 5GC and EPC interworking scenarios specified in clause B.1 of 3GPP TS 29.512 [18].

B.2 Nchf_SpendingLimitControl Service

B.2.1 Service Description

B.2.1.1 Overview

The overview in subclause 4.1.1 applies.

B.2.1.2 Service Architecture

The architecture in subclause 4.1.2 applies.

B.3 Service Operation

B.3.1 Introduction

The service operations defined in subclause 4.2 shall be applicable.

B.3.2 Nchf_SpendingLimitControl_Subscribe Service Operation

Subclause 4.2.2.2 and subclause 4.2.2.3 are applied with the differences that the PCF shall include (if available) in SpendingLimitContext data structure:

- the IMSI of the user within the "supi" attribute;

- the MSISDN of the user within the "gpsi" attribute;

B.3.3 Nchf_SpendingLimitControl_Unsubscribe Service Operation

Subclause 4.2.3 applies.

B.3.4 Nchf_SpendingLimitControl_Notify Service Operation

Subclause 4.2.4 applies.

Annex C (normative):
Wireless and wireline convergence access support

C.1 Scope

This annex defines procedures for wireless and wireline convergence access support for 5GS. The specific stage 2 definition and related procedures are contained in 3GPP TS 23.316 [19]. The System Architecture for wireless and wireline convergence access is defined in 3GPP TS 23.501 [2].

C.2 Nchf_SpendingLimitControl Service

C.2.1 Service Description

C.2.1.1 Overview

Subclause 4.1.1 applies with the following exceptions:

- the UE is replaced by the 5G-RG and the W-AGF, which is acting as a UE towards the 5GC on behalf of the FN-RG; and

- roaming is only applicable to a 5G-RG connecting to the 5GC via NG RAN, i.e., the H-PCF interaction with the H-CHF for the home-routed scenario only applies to a 5G-RG connecting to the 5GC via NG RAN.

C.2.1.2 Service Architecture

The architecture in subclause 4.1.2 applies.

C.3 Service Operation

C.3.1 Introduction

The service operations defined in subclause 4.2.1 apply.

C.3.2 Nchf_SpendingLimitControl_Subscribe Service Operation

C.3.2.1 General

Subclauses 4.2.2.2 and 4.2.2.3 are applied with the differences that the NF service consumer shall include (if available) in SpendingLimitContext data structure:

- a IMSI or a Global Cable Identifier (GCI) or a Global Line Identifier (GLI) as specified in 3GPP TS 23.316 [19] subclause 4.7, encoded as specified in 3GPP TS 29.571[11], subclause 5.3.2, within the "supi" attribute.

C.3.3 Nchf_SpendingLimitControl_Unsubscribe Service Operation

Subclause 4.2.3 applies.

C.3.4 Nchf_SpendingLimitControl_Notify Service Operation

Subclause 4.2.4 applies.

Annex D (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
2019-06	CT#84	CP-191189	0030	3	F	Precedence of OpenAPI file	15.4.0
2019-06	CT#84	CP-191189	0031	1	F	Copyright Note in YAML file	15.4.0
2019-06	CT#84	CP-191189	0033	-	F	OpenAPI version number update	15.4.0
2019-06	CT#84	CP-191089	0032	1	B	Race Condition handling	16.0.0
2019-09	CT#85	CP-192151	0035	-	A	NF service consumer pending policy counter handling	16.1.0
2019-09	CT#85	CP-192156	0036	1	B	Support of Expiry Time	16.1.0
2019-09	CT#85	CP-192151	0038	-	A	Correction to Subscription Termination service operation	16.1.0
2019-09	CT#85	CP-192151	0040	-	A	Correction to subscription creation/update response	16.1.0
2019-09	CT#85	CP-192151	0042	-	A	Corrections to subscription request descriptions	16.1.0
2019-09	CT#85	CP-192151	0044	-	A	Handling of unknown policy counters	16.1.0
2019-09	CT#85	CP-192173	0045	-	F	OpenAPI version update for TS 29.594 Rel-16	16.1.0
2020-06	CT#88e	CP-201233	0046	-	F	Description of "activationTime" attribute	16.2.0
2020-06	CT#88e	CP-201233	0047	-	F	Miscellaneous corrections	16.2.0
2020-06	CT#88e	CP-201244	0048	1	F	Storage of YAML files in ETSI Forge	16.2.0
2020-06	CT#88e	CP-201256	0049	1	F	URI of the Nchf_SpendingLimitControl service	16.2.0
2020-06	CT#88e	CP-201244	0050	1	F	Optionality of ProblemDetails	16.2.0
2020-06	CT#88e	CP-201244	0052	1	F	Supported headers, Resource Data type	16.2.0
2020-06	CT#88e	CP-201255	0053	-	F	Update of OpenAPI version and TS version in externalDocs field	16.2.0
2020-09	CT#89e	CP-202058	0056	1	A	Correction to spending limit subscribe and unsubscribe procedures	16.3.0
2020-09	CT#89e	CP-202058	0058	1	A	Nchf_SpendingLimitControl Service support of interworking	16.3.0
2020-12	CT#90e	CP-203139	0061	1	F	Essential corrections and alignments	16.4.0
2020-12	CT#90e	CP-203139	0062	1	F	Storage of YAML files in 3GPP Forge	16.4.0
2020-12	CT#90e	CP-203122	0064	1	A	Correction to Intermediate spending limit report retrieval	16.4.0
2020-12	CT#90e	CP-203128	0065	-	F	Correction to subscription's expiry time	16.4.0
2020-12	CT#90e	CP-203128	0066	1	F	Correction to subscription create service operation	16.4.0
2020-12	CT#90e	CP-203152	0068	-	F	Update of OpenAPI version and TS version in externalDocs field	16.4.0
2021-03	CT#91e	CP-210191	0070	2	F	Support of stateless NFs	16.5.0
2021-03	CT#91e	CP-210202	0071	2	F	Correction to Wireline Access information	16.5.0
2021-03	CT#91e	CP-210239	0078	-	F	Update of OpenAPI version and TS version in externalDocs field	16.5.0

History

Document history		
V16.2.0	August 2020	Publication
V16.3.0	November 2020	Publication
V16.4.0	January 2021	Publication
V16.5.0	April 2021	Publication