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Contents

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Introduction

1 Scope

The present document specifies the protocol that is used for service based interface. The API definitions and data type definitions are aligned with the common charging architecture specified in TS 32.240 [1]. The present document is related to other 3GPP charging TSs as follows:

- The common 3GPP charging architecture is specified in TS 32.240 [1].
- The 5G data connectivity is specified in TS 32.255[30].
- The service, operations and procedures of 5G charging for service based interface is specified in TS 32.290 [58].

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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[1] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[2] - [29] Void.

[30] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G Data connectivity domain charging; stage 2".

[31] - [49] Void.

[50] - [57] Void.

[58] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)5G system.

[59] - [99] Void.

[100] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[101] - [199] Void

[200] - [202] Void

[203] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[204] - [298] Void

[299] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[300] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[301] 3GPP TS 29.594: "5G System; Spending Limit Control Service; Stage 3".

[302] - [370] Void

[371] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[372] - [389] Void

[390] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[391] - [399] Void

[400] Void.

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

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

[403] - [499] Void.

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

[501] - [599] Void.

3 Definitions, symbols 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].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

3.3 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].

4 Overview

4.1 Service Architecture

The Converged Charging Service is provided by the CHF to the consumer and shown in the SBI representation model in figure 4. 1.1. The 5G Data connectivity domain charging is depicted in 3GPP TS 32.255 [30].

The ConvergedCharging Service (Nchf_ ConvergedCharging) is part of the Nchf service-based interface exhibited by the Charging Function (CHF) , with SMF as the NF Service Consume.

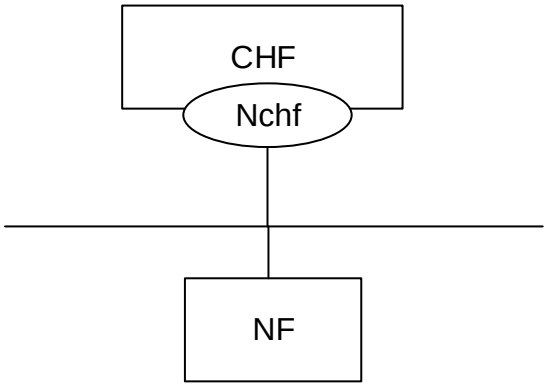

Figure 4. 1.1: Reference Architecture for the Nchf_ConvergedCharging Service; SBI representation

4.2 Network Functions

4.2.1 Charging Function (CHF)

The CHF is responsible for converged online charging and offline charging functionalities. The CHF provides the following:

- Quota;
- Re-authorisation triggers;
- Notification when Charging Domain determines rating conditions is affected or when CHF determines to terminate the charging service;
- Receiving service usage reports from NF Service Consumer; and
- CDRs generation.

4.2.2 NF Service Consumers

The NF Service Consumers shall support:

- Requesting and receiving the quota(s);
- Sending service usage reports; and
- Handling quota re-authorisation or abort notifications.

5 Services offered by the CHF

5.1 Introduction

The following services are provided by the CHF.

Table 5.1-1: NF Services provided by CHF

Service Name	Description	Consumer
Nchf_ConvergedCharging service	This service provides a converged charging for session and event based NF services, with and without quota management, as well as charging information record generation	SMF
Nchf_SpendingLimitControl	This service enables the PCF to retrieve policy counter status information per UE from the CHF by subscribing to spending limit reporting (i.e. notifications of policy counter status changes).	PCF

The "Nchf_SpendingLimitControl" service is defined in 29.594 [301].

5.2 Nchf_ConvergedCharging service

5.2.1 Service Description

This service provides charging in converged charging scenario by the CHF to the NF service consumer (i.e. SMF) as defined in subclause 6.2 in 3GPP TS 32.290[58].

It includes the following functionalities:

- Create resource at service establishment or no existing ChargingData resource, and may allocate quotas based on the request from NF consumer;

- During the service consumption lifecycle, update resource upon receiving the quota usage or service usage report under a number of circumstances and allocate subsequent quotas based on the request from NF consumer ;

- Release upon service termination, unused quota Timer expiry or error response; and

- Notify NF Service Consumer of the re-authorisation triggers when CHF determines rating conditions is affected , or the abort triggers when CHF determines to terminate the charging service.

- Charging information record generation

5.2.2 Service Operations

5.2.2.1 Introduction

The service operations defined for Nchf_ ConvergedCharging are shown in table 5.2.2.1-1.

Table 5.2.2.1-1: Nchf_ ConvergedCharging Operations

Service Operation Name	Description	Initiated by	Corresponding Converged charging messages in 3GPP TS 32.290[58]
Nchf_ ConvergedCharging_Create	First Interrogation of unit reservation; And/or initial report of service usage.	NF consumer	Charging Data Request/Response [Initial]
Nchf_ ConvergedCharging_Update	Intermediate Interrogation for subsequent units reservation when: - the granted service unitfor one rating group are spent - expiry of granted service units validity time - service events occur, which might affect the rating of the current service And/or Intermediate report of service usage.	NF consumer	Charging Data Request/Response [Update]
Nchf_ ConvergedCharging_Release	Final Interrogation without any unit reservation And/or last report of service usage.	NF consumer	Charging Data Request/Response [Termination]
Nchf_ ConvergedCharging_Notify	Request that the user be re-authorized or the charging session context be terminated.	CHF	Notify

5.2.2.2 Nchf_ConvergedCharging_Create Operation

The Nchf_ConvergedCharging_Create service operation provides means for NF (CTF) to request quotas for service delivery or initial report of service usage.

The following procedures using the Nchf_ConvergedCharging_Create service operation are supported:

- No existing chargingdata resource.

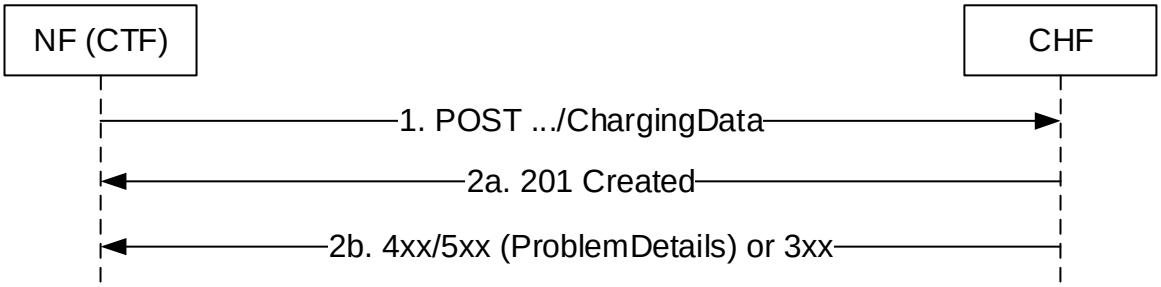

Figure 5.2.2.2-1: Nchf_ ConvergedCharging_Create Service Operation

1. NF (CTF) sends a Nchf_ConvergedCharging_Create request to the CHF to create resource for starting charging. requested quota and notification URI for Nchf_ConvergedCharging_Notify service operation are included in the request body.

2a. At successful operation, "201 Created" response is returned. In the "201 Created" response, the CHF includes a Location header field and the allocated quota in the body. The Location header field shall contain the URI of the created resource. The NF (CTF) shall use the URI received in the Location header in subsequent requests to the CHF for the same PDU session.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.2.3.1-3 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.7.3-1.

5.2.2.3 Nchf_ConvergedCharging_Update Operation

The Nchf_ConvergedCharging_Update service operation provides means for NF (CTF) to update the charging data.

The following procedures using the Nchf_ConvergedCharging_Update service operation are supported:

- the granted service units for one rating group are spent
- expiry of granted service units' validity time
- charging events occur, which might affect the rating of the current service
- receiving re-authorization notification from CHF

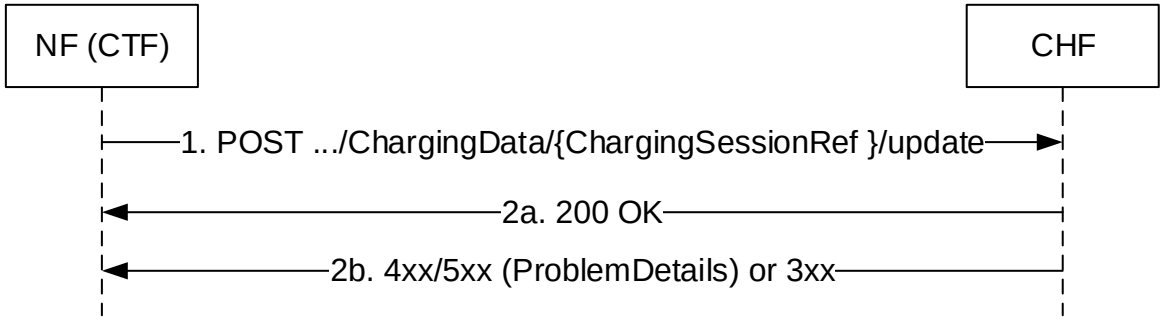

Figure 5.2.2.3-1: Nchf_ConvergedCharging_Update Service Operation

1. NF (CTF) sends a Nchf_ConvergedCharging_Update request to the CHF. The {ChargingSessionRef } in the URI identifies the "Charging Data" to be updated. The requested service unit and previous used service unit is included in the request body.

2a. At successful operation, "200 OK" response is returned. The CHF includes the granted service unit in the "200 OK" response.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.4.2.2-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.7.3-1.

5.2.2.4 Nchf_ConvergedCharging_Release Operation

The Nchf_ConvergedCharging_Release service operation provides means for NF (CTF) to terminate charging Session.

The following procedures using the Nchf_ConvergedCharging_Release service operation are supported:

- Expiry of unused quota timer.
- Abort notification is received from CHF.

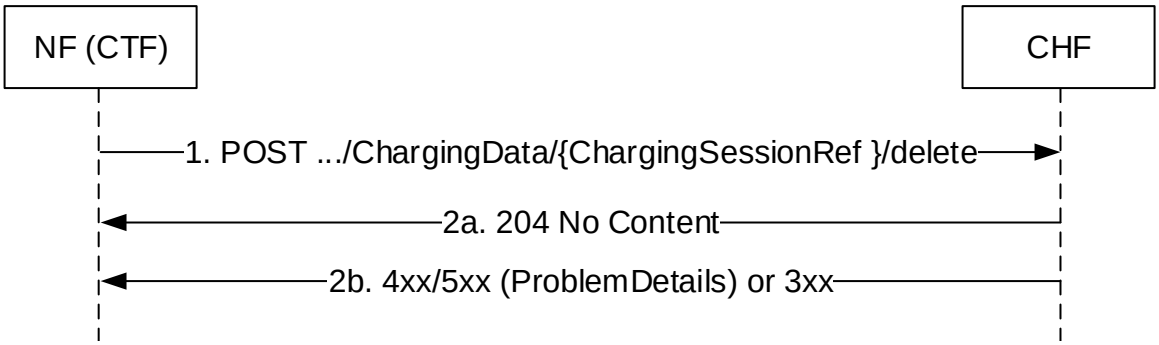

Figure 5.2.2.4-1: Nchf_ConvergedCharging_Release Service Operation

1. NF(CTF) sends a Nchf_ConvergedCharging_Release request to the CHF. The {ChargingSessionRef } in the URI identifies the "Charging Data" to be updated and then released. The final used service unit is included in the request body.

2a. At successful operation, "204 No Content" response is returned.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.4.3.2-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.7.3-1.

5.2.2.5 Nchf_ConvergedCharging_Notify Operation

The Nchf_ConvergedCharging_Notify service operation provides means for CHF to notify the NF(CTF) to update or terminate charging of the PDU Session.

The following procedures using the Nchf_ConvergedCharging_Notify service operation are supported:

- CHF determines re-authorization.
- CHF determines abort of charging.

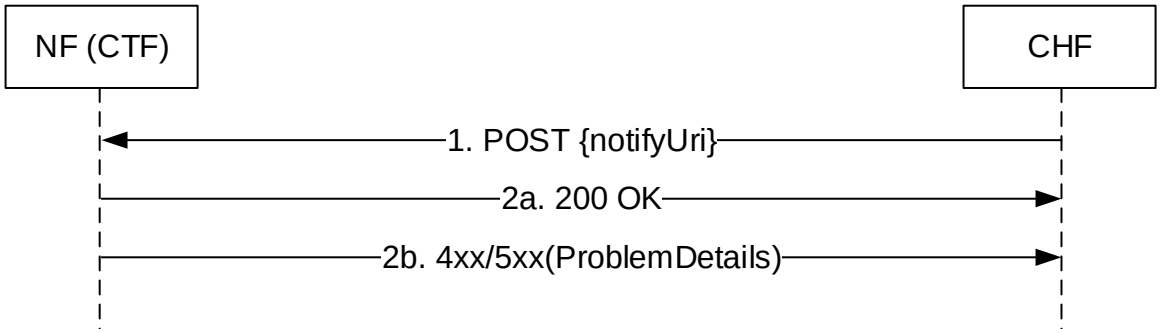

Figure 5.2.2.5-1: Nchf_ConvergedCharging_Notify Service Operation

1. The CHF sends a Nchf_ConvergedCharging_Notify request to the NF (CTF). The {notifyUri} identifies the notification URI which is sent in the Nchf_ConvergedCharging_Create request. The notification type is included in the request body.

2a. At successful operation, "200 OK" response is returned.

2b. On failure , one of the HTTP status code listed in Table 6.1.5.2.3.1-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.7.3-1.

6 API Definitions

6.1 Nchf_ ConvergedCharging Service API

6.1.1 Introduction

The APIs defined in this subclause implement the service operation defined in subclause 5.2.2.

The Nchf_ConvergedCharging service shall use the Nchf_ConvergedCharging API.

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

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].
- The {apiName} shall be "Nchf_ConvergedCharging".
- The {apiVersion} shall be "v1".
- The {apiSpecificResourceUriPart} shall be set as described in subclause 6.1.3.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2 as described in IETF RFC 7540 [401] shall be used as specified in subclause 5.2 of 3GPP TS 29.500 [299].

6.1.2.2 HTTP standard headers

6.1.2.2.1 General

See subclause 5.2.2 of 3GPP TS 29.500 [299] for the usage of HTTP standard headers.

HTTP/2, shall be transported as specified in subclause 5.3 of 3GPP TS 29.500 [299].

6.1.2.2.2 Content type

JSON, IETF RFC 8259 [402], 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 [299].

6.1.2.3 HTTP custom headers

6.1.2.3.1 General

HTTP custom header fields shall be supported as specified in subclause 5.2.3.2 of 3GPP TS 29.500 [299].

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

6.1.3 Resources

6.1.3.1 Overview

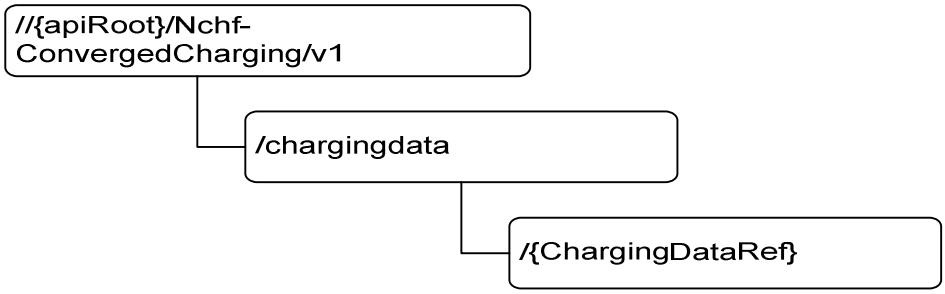

Figure 6.1.3.1-1: Resource URI structure of the Nchf_ConvergedCharging API

Charging Data Ref is a unique identifier for a charging data resource in a PLMN. It's created in CHF when CHF receives a Nchf_ ConvergedCharging_Create request and provided to NF (CTF) in the Location header field in the Nchf_ ConvergedCharging_Create response. The NF (CTF) shall use the Charging Data Ref received in subsequent requests to the CHF for the same charging data resource.

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description	Corresponding service operation
Charging Data	{apiRoot}/ Nchf_ConvergedCharging/ v1/chargingdata/	POST	Create a new Charging Data resource	Nchf_ ConvergedCharging_Create
Individual Charging Data	{apiRoot}/ Nchf_ConvergedCharging/v1/ chargingdata/{ChargingDataRef }/update	POST	Update an existing Charging Data resource.	Nchf_ ConvergedCharging_Update
	{apiRoot}/ Nchf_ConvergedCharging/v1/ chargingdata /{ChargingDataRef}/release	POST	Update and release an existing Charging Data resource.	Nchf_ ConvergedCharging_Release

6.1.3.2 Resource: Charging Data

6.1.3.2.1 Description

Charging Data resource represents a collection of the different charging data resources created by the CHF for converged charging as defined in 3GPP TS 32.290 [58].

6.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/Nchf_ConvergedCharging/v1/chargingData/**

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

Table 6.1.3.2.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 6.1.1

6.1.3.2.3 Resource Standard Methods

6.1.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.1.3.2.3.1-1.

Table 6.1.3.2.3.1-1: 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 6.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.2.3.1-3.

Table 6.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ChargingDataRequest	M	1	Parameters to create a new Charging Data resource.

Table 6.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ChargingDataResponse	M	1	201 Created	The creation of a Charging Data resource is confirmed and a representation of that resource is returned. The Charging Data resource which is created and returned successfully. The representation of created resource is identified via Location header field in the 201 response.
			307 Temporary Redirect	(NOTE 2)
ProblemDetails	M	1	400 Bad Request	(NOTE 2)
ProblemDetails	M	1	403 Forbidden	(NOTE 2)
ProblemDetails	M	1	404 Not Found	(NOTE 2)
ProblemDetails	M	1	405 Method Not Allowed	(NOTE 2)
ProblemDetails	M	1	408 Request Timeout	(NOTE 2)
ProblemDetails	M	1	500 Internal Server Error	(NOTE 2)
ProblemDetails	M	1	503 Service Unavailable	(NOTE 2)
ProblemDetails	M	1	508 Gateway Timeout	(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 [299] for the POST method shall also apply. NOTE 2: Failure cases are described in subclause 6.1.7.				

6.1.3.2.4 Resource Custom Operations

None.

6.1.3.3 Resource: Individual Charging Data

6.1.3.3.1 Description

Individual Charging Data resource represents a Charging data resource created in the CHF.

6.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/Nchf_ConvergedCharging/v1/chargingdata/{ChargingDataRef}**

This resource shall support the resource URI variables defined in table 6.1.3.3.2-1.

Table 6.1.3.3.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 6.1.1
ChargingDataRef	Charging data resource reference assigned by the CHF during the Nchf_ ConvergedCharging_Create operation,

6.1.3.3.3 Resource Standard Methods

None.

6.1.3.3.4 Resource Custom Operations

6.1.3.3.4.1 Overview

Table 6.1.3.3.4.1-1: Custom operations

Custom operaration URI	Mapped HTTP method	Description
{apiRoot}/ Nchf_ConvergedCharging/v1/ chargingdata/{ChargingDataRef }/update	POST	Update an existing Charging Data resource.
{apiRoot}/ Nchf_ConvergedCharging/v1/ chargingdata /{ChargingDataRef}/release	POST	Update and release an existing Charging Data resource.

6.1.3.3.4.2 Operation: update

6.1.3.3.4.2.1 Description

This operation updates an existing Charging Data resource.

6.1.3.3.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 6.1.3.3.4.2.2-1 and the response data structures and response codes specified in table 6.1.3.3.4.2.2-2.

Table 6.1.3.3.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ChargingDataRequest	M	1	Parameters to modify an existing Charging Data resource matching the ChargingDataRef according to the representation in the ChargingData. The request URI is the representation in the Location header field in the 201 response of resource creation.

Table 6.1.3.3.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ChargingDataResponse	M	1	200 OK	The modification of a Charging Data resource is confirmed and a representation of that resource is returned. The Charging Data resource which is modified and returned successfully.
			307 Temporary Redirect	(NOTE 2)
ProblemDetails	M	1	400 Bad Request	(NOTE 2)
ProblemDetails	M	1	403 Forbidden	(NOTE 2)
ProblemDetails	M	1	404 Not Found	(NOTE 2)
ProblemDetails	M	1	405 Method Not Allowed	(NOTE 2)
ProblemDetails	M	1	408 Request Timeout	(NOTE 2)
ProblemDetails	M	1	500 Internal Server Error	(NOTE 2)
ProblemDetails	M	1	503 Service Unavailable	(NOTE 2)
ProblemDetails	M	1	508 Gateway Timeout	(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 [299] for the POST method shall also apply. NOTE 2: Failure cases are described in subclause 6.1.7.				

6.1.3.3.4.3 Operation: release

6.1.3.3.4.3.1 Description

This operation update and release an existing Charging session

6.1.3.3.4.3.2 Operation Definition

This operation shall support the request data structures specified in table 6.1.3.3.4.3.2-1 and the response data structures and response codes specified in table 6.1.3.3.4.3.2-2.

Table 6.1.3.3.4.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ChargingDataRequest	M	1	Parameters to modify and then release the Charging Data resource matching the ChargingDataRef according to the representation in the ChargingData. The request URI is the representation in the Location header field in the 201 response of resource creation.

Table 6.1.3.3.4.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a	M	1	204 No Content	Successful case: The Charging Data resource matching the ChargingDataRef is modified and then released.
ProblemDetails	M	1	404 Not Found	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply. NOTE 2: Failure cases are described in subclause 6.1.7.				

6.1.4 Custom Operations without associated resources

None.

6.1.5 Notifications

6.1.5.1 General

Notifications shall comply to subclause 6.2 of 3GPP TS 29.500 [299] and subclause 4.6.2.3 of 3GPP TS 29.501 [300].

6.1.5.2 Event Notification

6.1.5.2.1 Description

The Notification is used by the CHF to notify NF consumers of the subscribed events is occurs , which implements the Nchf_ ConvergedCharging_Notify operation defined in 3GPP TS 32.290 [58].

6.1.5.2.2 Target URI

The Notification URI **"{notifyUri}"** shall be used with the resource URI variables defined in table 6.1.5.2.2-1.

Table 6.1.5.2.2-1: Resource URI variables for this resource

Name	Definition
notifyUri	String formatted as URI with the Notification URI is provided by the SMF during the creation of the Charging Data resource and within the ChargingData type, as defined in subclause 6.1.6.

6.1.5.2.3 Standard Methods

6.1.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.5.2.3.1-1 and the response data structures and response codes specified in table 6.1.5.2.3.1-2.

Table 6.1.5.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ChargingNotification	M	1	Provides Information about active Charging events. ChargingNotification data type is defined in subclause 6.1.6.

Table 6.1.5.2.3.1-2: 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	M	1	400 Bad Request	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [299] for the POST method shall also apply. NOTE 2: Failure cases are described in subclause 6.1.7.				

6.1.6 Data Model

6.1.6.1 General

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

The Nchf_ ConvergedCharging Service API allows the SMF to consume the converged charging service from the CHF as defined in 3GPP TS 32.290 [58].

Table 6.1.6.1-1 specifies the data types defined for the ConvergedCharging service based interface protocol.

Table 6.1.6.1-1: Nchf_ ConvergedCharging specific Data Types

Data type	Section defined	Description	Applicability
ChargingDataRequest	6.1.6.2.1.1 6.1.6.2.2.1	Describes the attributes of Charging Data Request to CHF for initial, update and termination of the charging session.	Request message
ChargingDataResponse	6.1.6.2.1.2 6.1.6.2.2.2	Describes the attributes of Charging Data Response from CHF on charging session initial, update and termination.	Response message
ChargingNotification	6.1.6.2.1.3	Describes Notifications about events that occurred.	Request message

Table 6.1.6.1-2 specifies data types re-used by the Nchf_ ConvergedCharging 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_ ConvergedCharging service based interface.

Table 6.1.6.1-2: Nchf_ConvergedCharging re-used Data Types

Data type	Reference	Comments	Applicability
Supi	3GPP TS 29.571 [371]	The identification of the user (i.e. IMSI, NAI).	
Uint32	3GPP TS 29.571 [371]	Unsigned 32-bit integers	
Uint64	3GPP TS 29.571 [371]	Unsigned 64-bit integers	
PduSessionId	3GPP TS 29.571 [371]	The identification of the PDU session.	
PduSessionType	3GPP TS 29.571 [371]	the type of a PDU session	
Uri	3GPP TS 29.571 [371]	tring providing an URI	
AccessType	3GPP TS 29.571 [371]	The identification of the type of access network.	
RatType	3GPP TS 29.571 [371]	The identification of the RAT type.	
Ipv4Addr	3GPP TS 29.571 [371]	The Ipv4 address allocated for the user.	
Ipv6Prefix	3GPP TS 29.571 [371]	The Ipv6 prefix allocated for the user.	
Pei	3GPP TS 29.571 [371]	The Identification of a Permanent Equipment.	
TimeZone	3GPP TS 29.571 [371]	Time zone imformation	
NfInstanceId	3GPP TS 29.571 [371]	String uniquely identifying a NF instance.	
Gpsi	3GPP TS 29.571 [371]	String identifying a Gpsi	
DefaultQoSInformation	3GPP TS 29.571 [371]	Identifies the information of the default QoS.	
UserLocation	3GPP TS 29.571 [371]	User location information	
PlmnId	3GPP TS 29.571 [371]	PLMN id	
AmfId	3GPP TS 29.571 [371]	String identifying the AMF ID	
DurationSec	3GPP TS 29.571 [371]	Identifies a period of time in units of seconds.	
Snssai	3GPP TS 29.571 [371]	SNSSAI	
ProblemDetails	3GPP TS 29.571 [371]	additional details of the error	
Flows	3GPP TS 29.514 [X]	Identifies the flows related to a RG	
SscMode	3GPP TS 29.571 [371]	SSC Mode type	
PraInfo	3GPP TS 29.512 [204]	PRA information including PRAId, PRA element list and PRA status	
Qfi	3GPP TS 29.571 [371]	QoS flow identifier designated as "Qfi".	

6.1.6.2 Structured data types

6.1.6.2.1 Common Data Type

6.1.6.2.1.1 Type ChargingDataRequest

Table 6.1.6.2.1.1-1: Definition of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
subscriberIdentifier	Supi	O M	0..1	5G Subscription Permanent Identifier (SUPI) of the served party, if available.	Request message
nfConsumerIdentification	NFConsumerIdentification	M	1	This is a grouped field which contains a set of information identifying the NF consumer of the charging service.	Request message
invocationTimeStamp	DateTime refer 3GPP TS 29.571 [371]	M	1	The time at which the request is send	Request message
invocationSequenceNumber	Uint32	M	1	This field contains the sequence number of the charging service invocation by the NF consumer.	Request message
notifyUri	Uri refer 3GPP TS 29.571 [371]	O C	0..1	Identifies the recipient of Notifications sent by the CHF. It's only present in create request message.	Request message
multipleUnitUsage	array(MultipleUnitUsage)	O C	0..N	This field contains the parameters for the quota management request and/or usage reporting.	Request message
triggers	array(Trigger)	O C	0..N	This field identifies the event(s) triggering the request.	

6.1.6.2.1.2 Type ChargingDataResponse

Table 6.1.6.2.1.2-1: Definition of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability
invocationTimestamp	DateTime	M	1	This field holds the the timestamp of the charging service response from the CHF.	Response message
invocationResult	InvocationResult	M	1	This field holds the result of the charging service invocation by the NF consumer	Response message
invocationSequenceNumber	Uint32	M	1	This field contains the sequence number of the charging service invocation by the NF consumer.	Response message
sessionFailover	SessionFailover	O_C	0..1	This field indicates whether alternative CHF is supported for ongoing charging service failover handling by NF consumer.	Response message
multipleQuotaInformation	array(MultipleQuotaInformation)	O_C	0..N	This field holds the parameters for the quota management information. It may have multiple occurences.	Response message
triggers	array(Trigger)	O_C	0..N	This field identifies the chargeable event(s) supplied by CHF to override/activate the exsting chargable event(s) in NF consumer. The presence of the triggers attribute without any triggerType is used by CHF to disable all the triggers.	Response message

6.1.6.2.1.3 Type ChargingNotification

Table 6.1.6.2.1.3-1: Definition of type ChargingNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
notificationType	NotificationType	M	1	Type of notification to indicate re-authorization or termination.	Request message
reauthorizationDetails	array(ReauthorizationDetails)	O_C	0..N	descriptors for re-authorization to determine which quota or usage reporting is updated. It's only present when type of notification is re-authorziation.In case that type of notification is re-authorziation and this attribute is not present, all type of units shall be updated.	Request message

6.1.6.2.1.4 Type NFConsumerIdentification

Table 6.1.6.2.1.4-1: Definition of type NFConsumerIdentification

Attribute name	Data type	P	Cardinality	Description	Applicability
nodeFunctionality	NodeFunctionality	M	1	This field contains the function of the node.	
nFName	NfInstanceId	M	1	Identifier of NF consumer	
nFIPv4Address	Ipv4Addr	M	1	The IPv4 address of the NF consumer used	
nFIPv6Address	Ipv6Addr	M	1	The IPv6 address of the NF consumer used	
nFPLMNID	PlmnId	O_C	0..1	This field holds the PLMN ID of the network the NF consumer belongs to.	

6.1.6.2.1.5 Type MultipleUnitUsage

Table 6.1.6.2.1.5-1: Definition of type MultipleUnitUsage

Attribute name	Data type	P	Cardinality	Description	Applicability
ratingGroup	RatingGroupId	M	1	The identifier of a rating group.	Request message
requestedUnit	RequestedUnit	O_C	0..1	This field contains the amount of requested service units for a particular category or an indication that units are needed for a particular category.	Request message
usedUnitContainer	array(UsedUnitContainer)	O_C	0..N	This field contains the amount of used non-monetary service units measured.	Request message

6.1.6.2.1.6 Type InvocationResult

Table 6.1.6.2.1.6-1: Definition of type InvocationResult

Attribute name	Data type	P	Cardinality	Description	Applicability
error	ProblemDetails	M	1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure.	
failureHandling	FailureHandling	O_C	0..1	This field holds the failure handling to be performed by the NF consumer, which is associated to the result code: Terminate, Continue, Retry and Terminate. In case of failure, it indicates which action to be performed by the NF consumer for the provided result code. In case of success, it indicates which action to be performed by the NF consumer in case subsequent charging service invocation are temporarily prevented.	

6.1.6.2.1.7 Type Trigger

Table 6.1.6.2.1.7-1: Definition of type Trigger

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerType	TriggerType	Oc	0..1	the events whose occurrence lead to charging event is issued towards the CHF	Request message Response message
category	TriggerCategory	M	1	This field indicates whether the charging data generated by the SMF for the trigger lead to a Charging Event towards the CHF immediately or not.	Response message
timeLimit	DurationSec	O_C	0..1	Time limit if trigger type is "Expiry of data time limit"	
volumeLimit	Uint32	O_C	0..1	Volume limit if trigger type is "Expiry of data volume limit"	
maxNumberOfccc	Uint32	O_C	0..1	Maximum nunmer if trigger type is "Max nb of number of charging condition changes"	

6.1.6.2.1.8 Type MultipleQuotaInformation

Table 6.1.6.2.1.8-1: Definition of type MultipleQuotaInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
resultCode	ResultCode	O_C	0..1	This field contains the result of the Rating group quota allocation.	
ratingGroup	RatingGroupId	M	1	The identifier of a rating group.	
grantedUnit	GrantedUnit	O_C	0..1	This field holds the granted quota.	
triggers	array(Trigger)	O_C	0..N	This field holds triggers for usage reporting associated to the rating group, which is supplied from the CHF. The presence of the triggers attribute without any triggerType is used by CHF to disable all the triggers to the associated rating group.	
validityTime	DateTime	O_C	0..1	This field defines the time in order to limit the validity of the granted quota for a given category instance.	
quotaHoldingTime	DurationSec	O_C	0..1	This field holds the quota holding time in seconds. It applies equally to the granted time quota and to the granted volume quota. The NF Consumer shall deem a quota to have expired when no traffic associated with the quota is observed for the value indicated by this attribute. A quotaHoldingTime value of zero indicates that this mechanism shall not be used. If the quotaHoldingTime attribute is not present, then a locally configurable default value in the NF Consumer shall be used.	
finalUnitIndication	FinalUnitIndication	O_C	0..1	This field indicates the granted final units for the service.	
timeQuotaThreshold	integer	O_C	0..1	indicates the threshold in seconds for the granted time quota.	
volumeQuotaThreshold	integer	O_C	0..1	indicates the threshold in octets when the granted quota is volume	
unitQuotaThreshold	integer	O_C	0..1	indicates the threshold in service specific units, that are defined in the service specific documents, when the granted quota is service specific	

6.1.6.2.1.9 Type RequestedUnit

Table 6.1.6.2.1.9-1: Definition of type RequestedUnit

Attribute name	Data type	P	Cardinality	Description	Applicability
time	Uint32	O_C	0..1	This field holds the amount of requested time.	
totalVolume	Uint64	O_C	0..1	This field holds the amount of requested volume in both uplink and downlink directions.	
uplinkVolume	Uint64	O_C	0..1	This field holds the amount of requested volume in uplink direction.	
downlinkVolume	Uint64	O_C	0..1	This field holds the amount of requested volume in downlink direction.	
serviceSpecificUnits	Uint64	O_C	0..1	This field holds the amount of requested service specific units.	

6.1.6.2.1.10 Type UsedUnitContainer

Table 6.1.6.2.1.10-1: Definition of type UsedUnitContainer

Attribute name	Data type	P	Cardinality	Description	Applicability
serviceId	ServiceId	O_C	0..1	This field identity of the used service	
quotaManagementIndicator	QuotaManagementIndicator	O_C	1	an indicator on whether the reported used units are with or without quota management control.If the attribute is not present, it indicates the used unit is without quota management applied.	
triggers	array (Trigger)	O_C	0..N	This field specifies the reason for usage reporting for one or more types of unit associated to the rating group.	
triggerTimestamp	DateTime	Oc	0..1	This field holds the timestamp when the reporting trigger occur.	
time	Uint32	O_C	0..1	This field holds the amount of requested time.	
totalVolume	Uint64	O_C	0..1	This field holds the amount of requested volume in both uplink and downlink directions.	
uplinkVolume	Uint64	O_C	0..1	This field holds the amount of requested volume in uplink direction.	
downlinkVolume	Uint64	O_C	0..1	This field holds the amount of requested volume in downlink direction.	
serviceSpecificUnits	Uint64	O_C	0..1	This field holds the amount of requested service specific units.	
eventTimeStamps	DateTime	O_C	0..1	This field holds the timestamps of the event reported in the Service Specific Unit s, if the reported units areevent based	
localSequenceNumber	integer	M	1	holds the Used Unit sequence number, i.e. the order when charging event occurs. It increased by 1 for each Used Unit generation.	

6.1.6.2.1.11 Type GrantedUnit

Table 6.1.6.2.1.11-1: Definition of type GrantedUnit

Attribute name	Data type	P	Cardinality	Description	Applicability
tariffTimeChange	DateTime	O_C	0..1	This field contains the switch time when the tariff will be changed.	
time	Uint32	O_C	0..1	This field holds the amount of granted time.	
totalVolume	Uint64	O_C	0..1	This field holds the amount of granted volume in both uplink and downlink directions.	
uplinkVolume	Uint64	O_C	0..1	This field holds the amount of granted volume in uplink direction.	
downlinkVolume	Uint64	O_C	0..1	This field holds the amount of granted volume in downlink direction.	
serviceSpecificUnits	Uint64	O_C	0..1	This field holds the amount of granted requested service specific units.	

6.1.6.2.1.12 Type FinalUnitIndication

Table 6.1.6.2.1.12-1: Definition of type FinalUnitIndication

Attribute name	Data type	P	Cardinality	Description	Applicability
finalUnitAction	FinalUnitAction	M	1	indicates to the service consumer the action to be taken when the user's account cannot cover the service cost	
restrictionFilterRule	IPFilterRule	O_C	0..1	filter rules corresponding to services that are to remain accessible even if there are no more service units granted.	
filterId	string	O_C	0..1	the IP packet filters corresponding to services that are to remain accessible even if there are no more service units granted.	
redirectServer	RedirectServer	O_C	0..1	the address information of the redirect server with which the end user is to be connected when the account cannot cover the service cost.	

6.1.6.2.1.13 Type RedirectServer

Table 6.1.6.2.1.13-1: Definition of type RedirectServer

Attribute name	Data type	P	Cardinality	Description	Applicability
redirectAddressType	RedirectAddressType	M	1	The type of redirect server address	
redirectServerAddress	string	M	1	the address of redirect server	

6.1.6.2.1.14 Type ReauthorizationDetails

Table 6.1.6.2.1.14-1: Definition of type ReauthorizationDetails

Attribute name	Data type	P	Cardinality	Description	Applicability
serviceIdentifier	ServiceId	O_C	0..1	an identifier for a service	
ratingGroup	RatingGroupId	M	1	the identifier of rating group	
quotaManagementIndicator	QuotaManagementIndicator	O_C	0..1	an indicator on whether the re-authorization notification is for quota management control or not. In case that this attribute is not present, all units associated to the rating group shall be updated.	

6.1.6.2.2 5G Data Connectivity Specified Data Type

6.1.6.2.2.1 Type ChargingDataRequest

This clause is additional attributes of the type ChargingDataRequest defined in clause 6.1.6.2.1.1 for 5G data connectivity charging described in 3GPP TS 32.255[30].

Table 6.1.6.2.2.1-1: 5G Data Connectivity Specified attribute of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
pDUSessionChargingInformation	PDUSessionChargingInformation	O_M	0..1	This field holds the 5G data connectivity specific information.	
roamingQBCInformation	RoamingQBCInformation	O_M	0..1	This field holds the 5G data connectivity specific information roaming QBC.	

6.1.6.2.2.2 Type ChargingDataResponse

This clause is additional attributes of the type ChargingDataResponse defined in clause 6.1.6.2.1.2 for 5G data connectivity charging described in 3GPP TS 32.255[30].

Table 6.1.6.2.2.2-1: 5G Data Connectivity Specified attribute of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability
pDUSessionChargingInformation	PDUSessionChargingInformation	O_M	0..1	This field holds the 5G data connectivity specific information.	
roamingQBCInformation	RoamingQBCInformation	O_M	0..1	This field holds the 5G data connectivity specific information roaming QBC.	

6.1.6.2.2.3 Type MultipleUnitUsage

This clause is additional attributes of the type MultipleQuotaUsage defined in clause 6.1.6.2.1.5 for 5G data connectivity charging described in 3GPP TS 32.255[30].

Table 6.1.6.2.2.3-1: 5G Data Connectivity Specified attribute of type MultipleUnitUsage

Attribute name	Data type	P	Cardinality	Description	Applicability
uPFID	NfInstanceId	O_C	0..1	identifer of UPF	Request message

6.1.6.2.2.4 Type MultipleQuotaInformation

This clause is additional attributes of the type MultipleQuotaInformation defined in clause 6.1.6.2.1.8 for 5G data connectivity charging described in 3GPP TS 32.255[30].

Table 6.1.6.2.2.4-1: 5G Data Connectivity Specified attribute of type MultipleQuotaInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
uPFID	NfInstanceId	Oc	0..1	UPF id	

6.1.6.2.2.5 Type UsedUnitContainer

This clause is additional portionof the type UsedUnitContainer defined in clause 6.1.6.2.1.10 for 5G data connectivity charging described in 3GPP TS 32.255[30].

Table 6.1.6.2.2.5-1: 5G Data Connectivity Specified portion of type UsedUnitContainer

Attribute name	Data type	P	Cardinality	Description	Applicability
pDUContainerInformation	PDUContainerInformation	O_C	0..1	the 5G data connectivity specific information	

6.1.6.2.2.6 Type PDUSessionChargingInformation

Table 6.1.6.2.2.6-1: Definition of type PDUSessionChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
chargingId	string	O_C	0..1	Correlates different records of a single PDU session	Request message
userInformation	UserInformation	M	1	including information of user equipment, user location	Request message Response message
userLocationinfo	UserLocation	O_C	0..1	provides information on the location	Request message
userLocationTime	DateTime	O_C	0..1	the time at which the UE was last known to be in the location.	Request message
presenceReportingAreaInformation	map(PraInfo)	O_C	0..N	When the data type is present in response message, it includes the PRA information provisioned by the CHF, in which case the praStatus attribute within the PraInfo data type shall not be supplied. When the data type is present in request message, it's used to report user presence reporting area status. The praId attribute within the PraInfo data type shall be the key of the map.	Request message Response message
uetimeZone	TimeZone	O_C	0..1	the UE Time Zone the UE is currently located	
pduSessionInformation	PDUSessionInformation	M	1	PDU session level information, including PDU session ID, PDU type, SSC Mode, QoS, network slicing etc.	Request message
unusedQuotaTimer	DurationSec	O_C	0..1	threshold for the time period resource idle Upon the initial interaction with the CHF, the SMF use this attibute to provide pre-configured threhold to CHF. when present in response message, it contains the threshold supplied by CHF in response of initial request to override existing threshold in SMF. It's only present when unused quota timer trigger is active.	Request message Response message

6.1.6.2.2.7 Type UserInformation

Table 6.1.6.2.2.7-1: Definition of type UserInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
servedGPSI	Gpsi	M	1	the Generic Public Subscription Identifier (GPSI) of the served party, if available.	Request message
servedPEI	Pei	O_C	0..1	the identification of Permanent Equipment Identifier.	Request message
unauthenticatedFlag	boolean	O_C	0..1	indicates the served SUPI is not authenticated	Request message
roamerInOut	RoamerInOut	O_C	0..1	In-bound or Out-bound roamer	

6.1.6.2.2.8 Type PDUSessionInformation

Table 6.1.6.2.2.8-1: Definition of type PDUSessionInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
networkSlicingInfo	NetworkSlicingInfo	O_M	0..1	information of network slice serving the PDU sessoin	
pduSessionID	PduSessionId	M	1		
pduType	PduSessionType	O_M	0..1	type of the PDU sessoin	
sscMode	SscMode	O_C	0..1	information of SSC Mode type.	
hPlmnId	PlmnId	O_C	0..1	PLMN identifier of the home network	
servingNodeID	array(AmfId)	O_C	0..N	This field holds the list of AMF Identifiers (AmfId) of AMFs.	
servingNetworkFunctionID	ServingNetworkFunctionID	Oc	0..1	This field holds serving Network Function identifier.	
servingCNPlmnId	PlmnId	Oc	0..1	Serving Core Network Operator PLMN ID selected by the UE in shared networks.	
ratType	RatType	O_C	0..1	the RAT Type of the PDU sessoin	
dnnId	string	M	1	a Data Network Name	
chargingCharacteristics	string	O_C	0..1	the Charging Characteristics for this PDU session.	
chargingCharacteristicsSelectionMode	ChargingCharacteristicsSelectionMode	O_C	0..1	information about how the "Charging Characteristics" was selected.	
startTime	dateTime	O_C	0..1	the time in UTC format which represents the start of a PDU session at the SMF	
stopTime	dateTime	O_C	0..1	the time in UTC format which represents the stop of a PDU session at the SMF	
3gppPSDataOffStatus	3GPPPSDataOffStatus	O_C	0..1	This field holds the 3GPP Data off Status when UE's 3GPP Data Off status is Activated or Deactivated.	
sessionStopIndicator	boolean	O_C	0..1	This field indicates to the CHF that the PDU session has been terminated.	
pduAddress	PDUAddress	O_C	0..1	Group of user ip address	
diagnostics	Diagnostics	O_C	0..1	provides a more detailed cause value from SMF.	
qoSInformation	DefaultQosInformation	O_C	0..1	This field holds the authorized QoS applied to PDU session.	

6.1.6.2.2.9 Type PDUContainerInformation

Table 6.1.6.2.2.9-1: Definition of type PDUContainerInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
timeofFirstUsage	DateTime	O_C	0..1	the time stamp for the first IP packet to be transmitted and mapped to the reporting used unit.	
timeofLastUsage	DateTime	O_C	0..1	the time stamp for the last IP packet to be transmitted and mapped to the reporting used unit.	
qoSInformation	DefaultQoSInformation	O_C	0..1	the QoS applied for the reporting used unit.	
aFCorrelationInformation	string	O_C	0..1	An identifier, provided from the AF, correlating the measurement for the Charging key/Service identifier values in this PCC rule with application level reports.	
userLocationInformation	UserLocation	O_C	0..1	provides information on the location	
uetimeZone	TimeZone	O_C	0..1	the UE Time Zone during the used unit container interval.	
rATType	RatType	O_C	0..1	the RAT Type of the used unit	
servingNodeID	array(AmfId)	O_C	0..N	the list of serving node identifiers during the used unit container interval.	
presenceReportingAreaInformation	map(PraInfo)	O_C	0..N	the Presence Reporting Area status of UE during the used unit container interval.	
3gppPSDataOffStatus	3GPPPSDataOffStatus	O_C	0..1	the 3GPP Data off Status during the used unit container interval.	
sponsorIdentity	string	O_C	0..1	an identifier of the sponsor.	
applicationserviceProviderIdentity	string	O_C	0..1	an identifier of the application service provider	
chargingRuleBaseName	string	O_C	0..1	the reference to group of PCC rules predefined at the SMF.	

6.1.6.2.2.10 Type NetworkSlicingInfo

Table 6.1.6.2.2.10-1: Definition of type NetworkSlicingInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
sNSSAI	Snssai	M	1	Single Network Slice Selection Assistance Information	

6.1.6.2.2.11 Type PDUAddress

Table 6.1.6.2.2.11-1: Definition of type PDUAddress

Attribute name	Data type	P	Cardinality	Description	Applicability
pduIPv4Address	Ipv4Addr	O_C	0..1	the IPv4 address of the served SUPI allocated for the PDU session	
pduIPv6Address	Ipv6Addr	O_C	0..1	the IPv6 address of the served SUPI allocated for the PDU session	
pduAddressprefixlength	integer	O_C	0..1	PDU Address prefix length of an IPv6 typed Served PDU Address. The field needs not available for prefix length of 64 bits.	
IPv4dynamicAddressFlag	boolean	O_C	0..1	This field indicates whether served IPv4 PDU address is dynamically allocated. This field is missing if address is static.	
IPv6dynamicAddressFlag	boolean	O_C	0..1	This field indicates whether served IPv6 PDU address is dynamically allocated. This field is missing if address is static.	

6.1.6.2.2.12 Type ServingNetworkFunctionID

Table 6.1.6.2.2.12-1: Definition of type ServingNetworkFunctionID

Attribute name	Data type	P	Cardinality	Description	Applicability
servingNetworkFunctionName	string	O_C	0..1	This field holds the name of the serving Network Function (i.e. AMF).	
servingNetworkFunctionInstanceid	string	O_C	0..1	This field holds the identifier of the serving Network Function instance.	

6.1.6.2.2.13 Type RoamingQBCInformation

Table 6.1.6.2.1.15-1: Definition of type RoamingQBCInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
multipleQFIcontainer	array(MultipleQFIcontainer)	Oc	0..N	list of QFI containers	
uPFID	NfInstanceId	O_C	0..1	identifer of UPF	
roamingChargingProfile	RoamingChargingProfile	O_C	0..1	Roaming Charging Profile associated to the PDU session for roaming QBC.	

6.1.6.2.2.14 Type MultipleQFIcontainer

Table 6.1.6.2.1.16-1: Definition of type MultipleQFIcontainer

Attribute name	Data type	P	Cardinality	Description	Applicability
triggers	array (Trigger)	Oc	0..N	This field holds reason for closing the QFI unit container.	
triggerTimestamp	DateTime	Oc	0..1	This field holds the timestamp when the reporting trigger occur.	
time	Uint32	O_C	0..1	This field holds the amount of time.	
totalVolume	Uint64	O_C	0..1	This field holds the amount of volume in both uplink and downlink directions.	
uplinkVolume	Uint64	O_C	0..1	This field holds the amount of volume in uplink direction.	
localSequenceNumber	integer	M	1	QFI data container sequence number	
qFIContainerInformation	QFIContainerInformation	O_C	0..1	This field holds the QFI data container information	

6.1.6.2.2.15 Type RoamingChargingProfile

Table 6.1.6.2.1.17-1: Definition of type RoamingChargingProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
trigger	array(Trigger)	O_C	0..N	Trigger for roaming QBC	
partialRecordMethod	PartialRecordMethod	Oc	0..1	method uses for partial record closure	

6.1.6.2.2.16 Type QFIContainerInformation

Table 6.1.6.2.1.18-1: Definition of type QFIContainerInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
qFI	Qfi	O_M	0..1	QoS Flow Identifier (QFI)	
timeofFirstUsage	DateTime	O_C	0..1	the time stamp for the first IP packet to be transmitted and mapped to the QFI container	
timeofLastUsage	DateTime	O_C	0..1	the time stamp for the last IP packet to be transmitted and mapped to the QFI container.	
qoSInformation	DefaultQoSInformation	O_C	0..1	the QoS applied to QFI container.	
userLocationInformation	UserLocation	O_C	0..1	provides information on the location	
uetimeZone	TimeZone	O_C	0..1	UE Time Zone the UE is currently located	
presenceReportingAreaInformation	map(PraInfo)	O_C	0..N	the Presence Reporting Area status of UE during the used unit container interval.	
rATType	RatType	O_C	0..1	the RAT Type of the used unit	
servingNetworkFunctionID	array(AmfId)	O_C	0..N	the list of AMF Identifiers during the used unit container interval.	
3gppPSDataOffStatus	3GPPPSDataOffStatus	O_C	0..1	the 3GPP Data off Status during the used unit container interval.	

6.1.6.3 Simple data types and enumerations

6.1.6.3.1 Introduction

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

6.1.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

Table 6.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
RatingGroupId	integer	identifier of rating group	
ServiceId	integer	identifier of service	
Diagnostics	integer	a more detailed cause value from SMF	
IPFilterRule	string	filter rules corresponding to services	

6.1.6.3.3 Enumeration: NotificationType

Table 6.1.6.3.3-1: Enumeration NotificationType

Enumeration value	Description	Applicability
REAUTHORIZATION	This value is used to indicate re-authorization.	
ABORT_CHARGING	This value is used to indicate termination of charging for PDU session.	

6.1.6.3.4 Enumeration: NodeFunctionality

Table 6.1.6.3.4-1: Enumeration NodeFunctionality

Enumeration value	Description	Applicability
SMF	This field identifies that NF service consumer is a SMF.	

6.1.6.3.5 Enumeration: ChargingCharacteristicsSelectionMode

Table 6.1.6.3.5-1: Enumeration ChargingCharacteristicsSelectionMode

Enumeration value	Description	Applicability
HOME_DEFAULT	the subscriber belongs to the same PLMN as the SMF	
ROAMING_DEFAULT	the subscriber belongs to same PLMN and the AMF belongs to a different PLMN	
VISITING_DEFAULT	the subscriber belongs to a different PLMN	

6.1.6.3.6 Enumeration: TriggerType

Table 6.1.6.3.6-1: Enumeration TriggerType

Enumeration value	Description	Applicability
QUOTA_THRESHOLD	the quota threshold has been reached	
QHT	the quota holding time specified in a previous response has been hit (i.e. the quota has been unused for that period of time)	
FINAL	a service termination has happened	
QUOTA_EXHAUSTED	the quota has been exhausted	
VALIDITY_TIME	the credit authorization lifetime provided from CHF has expired	
OTHER_QUOTA_TYPE	usage reporting of the particular quota type indicated in the used unit container where it appears is that, for a multi-dimensional quota, one reached a trigger condition and the other quota is being reported.	
FORCED_REAUTHORISATION	a Server initiated re-authorization procedure, i.e. receipt of notify service operation	
UNUSED_QUOTA_TIMER	the unused quota timer has expired	
ABNORMAL_RELEASE	PDU session has abnormal released.	
QOS_CHANGE	In request message, This value is used to indicate that OoS change has happened. In response message, this value is used to indicate that a change in the end user negotiated QoS shall cause the service consumer to ask for a re-authorization of the associated quota	
VOLUME_LIMIT	Volume limit has been reached.	
TIME_LIMIT	Time limit has been reached	
EVENT_LIMIT	Event limit has been reached	
PLMN_CHANGE	PLMN has been changed.	
USER_LOCATION_CHANGE	In request message, This value is used to indicate that User location has been changed. In response message, this value is used to indicate that a change in the end user location shall cause the service consumer to ask for a re-authorization of the associated quota	
RAT_CHANGE	In request message, This value is used to indicate that RAT type has been changed. In response message, this value is used to indicate that a change in the the radio access technology shall cause the service consumer to ask for a re-authorization of the associated quota	
UE_TIMEZONE_CHANGE	In request message, This value is used to indicate that UE timezone has been changed. In response message, this value is used to indicate that a change in the TimeZone where the end user is located shall cause the service consumer to ask for a re-authorization of the associated quota.	
TARIFF_TIME_CHANGE	Tariff time change has happened.	
MAX_NUMBER_OF_CHANGES_IN CHARGING_CONDITIONS	Max number of change has been reached	
MANAGEMENT_INTERVENTION	Management intervertion	
CHANGE_OF_UE_PRESENCE_IN PRESENCE_REPORTING_AREA	In request message, This value is used to indicate that Change of UE presence in PRA has happened. In response message, this value is used to indicate a request of reporting the event that the user enters/leaves the area(s) as indicated in the presenceReportingArea Attribute	
CHANGE_OF_3GPP_PS_DATA_OFF _STATUS	In request message, This value is used to indicate that Change of 3GPP PS Data off status has happened. In response message, this value is used to indicate that a change in the 3GPP PS Data off status shall cause the service consumer to ask for a re-authorization of the associated quota	

SERVING_NODE_CHANGE	A serving node (e.g., AMF) change in the NF Cosumer	
REMOVAL_OF_UPF	A used UPF is removed	
ADDITION_OF_UPF	A new UPF is added.	

6.1.6.3.7 Enumeration: FinalUnitAction

Table 6.1.6.3.7-1: Enumeration FinalUnitAction

Enumeration value	Description	Applicability
TERMINATE	The service consumer should terminate the service session.	
REDIRECT	The service consumer should redirect the user to the address specified in the redirectServerAddress attribute.	
RESTRICT_ACCESS	The service consumer should restrict the user access according to the IP packet filters defined in the restrictionFilterRule attribute or according to the IP packet filters identified by the filterId attribute.	

6.1.6.3.8 Enumeration: RedirectAddressType

Table 6.1.6.3.8-1: Enumeration RedirectAddressType

Enumeration value	Description	Applicability
IPV4	the redirect server address is IPV4.	
IPV6	the redirect server address is IPV6.	
URL	the redirect server address is URL.	

6.1.6.3.9 Enumeration: TriggerCategory

Table 6.1.6.3.9-1: Enumeration TriggerCategory

Enumeration value	Description	Applicability
IMMEDIATE_REPORT	chargeable events for which, when occurring, the charging data generated by the SMF triggers a Charging Event towards the CHF.	
DEFERRED_REPORT	chargeable events for which, when occurring, the charging data generated by the SMF, does not trigger a Charging Event towards the CHF .	

6.1.6.3.10 Enumeration: QuotaManagementIndicator

Table 6.1.6.3.10-1: Enumeration QuotaManagementIndicator

Enumeration value	Description	Applicability
ONLINE_CHARGING	quota management control	
OFFLINE_CHARGING	without quota management control	

6.1.6.3.11 Enumeration: FailureHandling

Table 6.1.6.3.11-1: Enumeration FailureHandling

Enumeration value	Description	Applicability
TERMINATE	the service MUST only be granted for as long as there is a connection to the CHF.	
CONTINUE	the SMF SHOULD re-send and continue the request to an alternative server in the case of transport or temporary failures, provided that a failover procedure is supported in the CHF and the SMF, and that an alternative server is available. Otherwise, the service SHOULD be granted, even if credit-control messages can't be delivered.	
RETRY_AND_TERMINATE	the SMF SHOULD re-send the request to an alternative server in the case of transport or temporary failures, provided that a failover procedure is supported in the CHF and SMF, and that an alternative server is available. Otherwise, the service SHOULD not be granted when the Nchf messages can't be delivered.	

6.1.6.3.12 Enumeration: SessionFailover

Table 6.1.6.3.12-1: Enumeration SessionFailover

Enumeration value	Description	Applicability
FAILOVER_NOT_SUPPORTED	The Nchf_ConvergedCharging messages could not be moved to an alternative destination in the case of communication failure. This is the default behavior if the attribute is not present in the response.	
FAILOVER_SUPPORTED	The Nchf_ ConvergedCharging messages should be moved to an alternative destination in the case of communication failure.	

6.1.6.3.13 Enumeration: 3GPPPSDataOffStatus

Table 6.1.6.3.13-1: Enumeration 3GPPPSDataOffStatus

Enumeration value	Description	Applicability
ACTIVE	3GPP PS data off status is active.	
INACTIVE	3GPP PS data off status is inactive.	

6.1.6.3.14 Enumeration: ResultCode

Table 6.1.6.3.14-1: Enumeration ResultCode

Enumeration value	Description	Applicability
END_USER_SERVICE_DENIED	The CHF denies the service request due to service restrictions (e.g. terminate rating group) or limitations related to the end-user, for example the end user's account could not cover the requested service.	
CREDIT_CONTROL_NOT_APPLICABLE	The CHF determines that the service can be granted to the end user but no further credit control needed for the service.	
CREDIT_LIMIT_REACHED	The CHF denies the service request since the end user's account could not cover the requested service. If the request contained used units they are deducted, if possible.	
AUTHORIZATION_REJECTED	The CHF denies the service request in order to terminate the service for which credit is equested.	
USER_UNKNOWN	The specified end user could not be found in the CHF.	
RATING_FAILED	This error code is used to inform the SMF that the CHF cannot rate the service request due to insufficient rating input, incorrect parameters combination or due to a parameter or parameter value that is not recognized or supported in the rating.	

6.1.6.3.15 Enumeration: PartialRecordMethod

Table 6.1.6.3.15-1: Enumeration PartialRecordMethod

Enumeration value	Description
DEFAULT	Default method used for partial records
INDIVIDUAL	Individual methos used for partial records

6.1.6.3.16 Enumeration: RoamerInOut

The enumeration RoamerInOut indicates whether the user is an in-bound or out-bound roamer.

Table 6.1.6.3.16-1: Enumeration RoamerInOut

Enumeration value	Description
IN_BOUND	In-bound roamer.
OUT_BOUND	Out-bound roamer.

6.1.6.4 Data types describing alternative data types or combinations of data types

None.

6.1.6.5 Binary data

None.

6.1.7 Error handling

6.1.7.1 General

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

For the Nchf_ConvergedCharging API, HTTP error responses shall be supported as specified in subclause 4.8 of 3GPP TS 29.501 [2]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4]. In addition, the requirements in the following subclauses shall apply.

6.1.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the Nchf_ConvergedCharging API compared to the Protocol Error Handling specified in subclause 5.2.7.2 of 3GPP TS 29.500 [7].

6.1.7.3 Application Errors

The application errors defined for the Nchf_ConvergedCharging API are listed in table 6.1.7.3-1. 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 6.1.7.3-1. The common application errors defined in the Table 5.2.7.2-1 in 3GPP TS 29.500 [7] may also be used for the Npcf_ConvergedCharging service.

Table 6.1.7.3-1: Application errors

Application Error	HTTP status code	Description
CHARGING_FAILED	400 Bad Request	The HTTP request is rejected because the set of session or subscriber information needed by the CHF for charging or CDR creation is incomplete or erroneous or not available. (E.g. Rating Group, subscriber information)
CHARGING_NOT_APPLICABLE	403 Forbidden	The HTTP request is rejected by the CHF since it has been determined that the service can be granted to the end user without any charging or CDR creation.
USER_UNKNOWN	404 Not Found	The HTTP request is rejected because the end user specified in the request cannot be served by the CHF.
CHARGING_METHOD_NOT_ALLOWED	405 Method Not Allowed	The HTTP request is rejected by the CHF since the requested Charging method is not allowed.

6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Nchf_ConvergedCharging API. They shall be negotiated using the extensibility mechanism defined in subclause 6.6 of 3GPP TS 29.500 [299].

Table 6.1.8-1: Supported Features

Feature number	Feature Name	Description

7 Bindings of CDR field, Information Element and Resource Attribute

This clause aims to describe the mapping between the Service Charging Information element, Resource Attribute and CDR field for 5G charging.

Table 7.1-1 and 7.2-1 describes the mapping of the Information Element, Resource Attribute and CDR field of CHF-CDR for 5G charging.

7.1 Bindings of common CDR field, Information Element and Resource Attribute

Table 7.1-1: Bindings of common CDR field, Information Element and Resource Attribute

Information Element	CDR Field	Resource Attribute
Session Identifier		
		ChargingDataRequest
Subscriber Identifier	Subscriber Identifier	/subscriberIdentifier
Invocation Timestamp	-	/invocationTimeStamp
Invocation Sequence Number	-	/invocationSequenceNumber
NF Consumer Identification	NF Information	/nfConsumerIdentification
NF Name	Recording Network Function ID	/nfConsumerIdentification/nFName
NF Address	SMF Address	/nfConsumerIdentification/nFIPv4Address /nfConsumerIdentification/nFIPv6Address
NF PLMN ID	SMF PLMN ID	/nfConsumerIdentification/nFPLMNID
NF Functionality	Record Type	/nfConsumerIdentification/nodeFunctionality
Notify URI		/notifyUri
Multiple Unit Usage	List of Multiple Unit Usage	/multipleUnitUsage
Rating Group	Rating Group	/multipleUnitUsage/ratingGroup
Requested Unit	-	/multipleUnitUsage/requestedUnit
Time	-	/multipleUnitUsage/requestedUnit/time
Total Volume	-	/multipleUnitUsage/requestedUnit/totalVolume
Uplink Volume	-	/multipleUnitUsage/requestedUnit/uplinkVolume
Downlink Volume	-	/multipleUnitUsage/requestedUnit/downlinkVolume
Service Specific Units	-	/multipleUnitUsage/requestedUnit/serviceSpecificUnits
Used Unit Container	Used Unit Container	/multipleUnitUsage/usedUnitContainer
Service Identifier	Service Identifier	/multipleUnitUsage/usedUnitContainer/serviceId
Quota management Indicator	Quota management Indicator	/multipleUnitUsage/usedUnitContainer/quotaManagementIndicator
Triggers	Triggers	/multipleUnitUsage/usedUnitContainer/triggers
Trigger Timestamp	Trigger Timestamp	/multipleUnitUsage/usedUnitContainer/triggerTimestamp
Time	Time	/multipleUnitUsage/usedUnitContainer/time
Total Volume	Total Volume	/multipleUnitUsage/usedUnitContainer/totalVolume
Uplink Volume	Uplink Volume	/multipleUnitUsage/usedUnitContainer/uplinkVolume
Downlink Volume	Downlink Volume	/multipleUnitUsage/usedUnitContainer/downlinkVolume
Service Specific Unit	Service Specific Unit	/multipleUnitUsage/usedUnitContainer/serviceSpecificUnits
Event Time Stamps	Event Time Stamps	/multipleUnitUsage/usedUnitContainer/eventTimeStamps
Local Sequence Number	Local Sequence Number	/multipleUnitUsage/usedUnitContainer/localSequenceNumber
Triggers	Service Condition Change	/triggers
		ChargingDataResponse
Invocation Timestamp		/invocationTimeStamp
Invocation Sequence Number		/invocationSequenceNumber
Session Failover	-	/sessionFailover
Triggers	-	/triggers
Multiple Quota information	-	/multipleQuotaInformation
Result Code	-	/multipleQuotaInformation/resultCode
Rating Group	-	/multipleQuotaInformation/ratingGroup
Granted Unit	-	/multipleQuotaInformation/grantedUnit
Tariff Time Change	-	/multipleQuotaInformation/grantedUnit/tariffTimeChange
Time	-	/multipleQuotaInformation/grantedUnit/time
Total Volume	-	/multipleQuotaInformation/grantedUnit/totalVolume
Uplink Volume	-	/multipleQuotaInformation/grantedUnit/uplinkVolume
Downlink Volume	-	/multipleQuotaInformation/grantedUnit/downlinkVolume

Service Specific Units	-	/multipleQuotaInformation/grantedUnit/serviceSpecificUnits
Triggers	-	/multipleQuotaInformation/triggers
Validity Time	-	/multipleQuotaInformation/validityTime
Quota Holding Time	-	/multipleQuotaInformation/quotaHoldingTime
Final Unit Indication	-	/multipleQuotaInformation/finalUnitIndication
Time Quota Threshold	-	/multipleQuotaInformation/timeQuotaThreshold
Volume Quota Threshold	-	/multipleQuotaInformation/volumeQuotaThreshold
Unit Quota Threshold	-	/multipleQuotaInformation/unitQuotaThreshold
Invocation Result	-	/invocationResult
Result code	-	/invocationResult/error
Failed parameter	-	/invocationResult/error
Failure Handling	-	/invocationResult/failureHandling

7.2 Bindings for 5G data connectivity

Table 7.2-1: Bindings of 5G data connectivity CDR field, Information Element and Resource Attribute

Information Element	CDR Field	Resource Attribute
		ChargingDataRequest
Multiple Unit Usage	List of Multiple Unit Usage	/multipleUnitUsage
UPF ID	UPF Id	/multipleUnitUsage/uPFID
Used Unit Container	Used Unit Container	/multipleUnitUsage/usedUnitContainer
PDU Container Information	PDU Container Information	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation
Time of First Usage	Time of First Usage	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/timeofFirstUsage
Time of Last Usage	Time of Last Usage	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/timeofLastUsage
QoS Information	QoS Information	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/qoSInformation
AF Correlation Information	AF Correlation Information	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/aFCorrelationInformation
User Location Information	User Location Information	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/userLocationInformation
RAT Type	RAT Type	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/rATType
Serving Network Function ID	Serving Network Function ID	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/servingNodeID
Presence Reporting Area Information	Presence Reporting Area Status	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/ presenceReportingAreaInformation
3GPP PS Data Off Status	3GPP PS Data Off Status	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/3gppPSDataOffStatus
Sponsor Identity	Sponsor Identity	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/sponsorIdentity
Application Service Provider Identity	Application Service Provider Identity	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/applicationserviceProviderIdentity
Charging Rule Base Name	Charging Rule Base Name	/multipleUnitUsage/usedUnitContainer/pDUUnitUsageInformation/chargingRuleBaseName
		ChargingDataResponse
Multiple Unit information	-	/multipleQuotaInformation
UPF ID	-	/multipleQuotaInformation/uPFID
PDU Session Charging Information	PDU Session Charging Information	/pDUSessionChargingInformation
Charging ID	Charging ID	/pDUSessionChargingInformation/ChargingID
User Information	User Information	/pDUSessionChargingInformation/ userInformation
User Identifier	User Identifier	/pDUSessionChargingInformation/userInformation/servedGPSI
User Equipment Info	User Equipment Info	/pDUSessionChargingInformation/userInformation/ servedPEI
Unauthenticated Flag	Unauthenticated Flag	/pDUSessionChargingInformation/userInformation/ unauthenticatedFlag
Roamer In Out	Roamer In Out	/pDUSessionChargingInformation/userInformation/ roamerInOut
User Location Info	User Location Info	/pDUSessionChargingInformation/ userLocationinfo
User Location Time	User Location Time	/pDUSessionChargingInformation/ userLocationTime
Presence Reporting Area Information	Presence Reporting Area Information	/pDUSessionChargingInformation/ presenceReportingAreaInformation
UE Time Zone	UE Time Zone	/pDUSessionChargingInformation/uEtimeZone
PDU Session Information	PDU Session Information	/pDUSessionChargingInformation/pduSessionInformation
PDU Session ID	PDU Session ID	/pDUSessionChargingInformation/pduSessionInformation/pduSessionID
Network Slice Instance Identifier	Network Slice Instance Identifier	/pDUSessionChargingInformation/networkSlicingInfo
PDU Type	PDU Type	/pDUSessionChargingInformation /pduSessionInformation/pdpType

SSC Mode	SSC Mode	/pDUSessionChargingInformation /pduSessionInformation/sscMode
SUPI PLMN ID	SUPI PLMN ID	/pDUSessionChargingInformation /pduSessionInformation/hPlmnId
GUAMI	GUAMI	/pDUSessionChargingInformation / servingNodeID
Serving Network Function ID	Serving Network Function ID	/pDUSessionChargingInformation / servingNetworkFunctionID
RAT Type	RAT Type	/pDUSessionChargingInformation /pduSessionInformation/ratType
Data Network Name Identifier	Data Network Name Identifier	/pDUSessionChargingInformation /pduSessionInformation/dnnid
PDU Address	PDU Address	/pDUSessionChargingInformation /pduSessionInformation/pduAddress
PDU IP Address	PDU IP Address	/pDUSessionChargingInformation/pduSessionInformation/pduAddress/pduIPv4Address /pDUSessionChargingInformation/pduSessionInformation/pduAddress/pduIPv6Address
PDU Address prefix length	PDU Address prefix length	/pDUSessionChargingInformation /pduSessionInformation/pduAddress/pduAddressprefixlength
Dynamic Address Flag	Dynamic Address Flag	/pDUSessionChargingInformation /pduSessionInformation/pduAddress/dynamicAddressFlag
QoS information	Charging Characteristics	/pDUSessionChargingInformation /pduSessionInformation/qoSInformation
Charging Characteristics	Charging Characteristics Selection Mode	/pDUSessionChargingInformation /pduSessionInformation/ chargingCharacteristics
Charging Characteristics Selection Mode	PDU session start Time	/pDUSessionChargingInformation /pduSessionInformation/chargingCharacteristicsSelectionMode
PDU session start Time	PDU session stop Time	/pDUSessionChargingInformation /pduSessionInformation/startTime
PDU session stop Time	Diagnostics	/pDUSessionChargingInformation /pduSessionInformation/stopTime
Diagnostics	3GPP PS Data Off Status	/pDUSessionChargingInformation /pduSessionInformation/diagnostics
3GPP PS Data Off Status	Session Stop Indicator	/pDUSessionChargingInformation /pduSessionInformation/3gppPSDataOffStatus
Session Stop Indicator	Charging ID	/pDUSessionChargingInformation /pduSessionInformation/sessionStopIndicator
Unused Quota Timer	-	/pDUSessionChargingInformation/unusedQuotaTimer
Roaming QBC information	Roaming QBC information	/roamingQBCInformation
Multiple QFI container	Multiple QFI container	/roamingQBCInformation
Triggers	Triggers	/roamingQBCInformation/ triggers
Trigger Timestamp	Trigger Timestamp	/roamingQBCInformation/ triggerTimestamp
Time	Time	/roamingQBCInformation/ time
Total Volume	Total Volume	/roamingQBCInformation/ totalVolume
Uplink Volume	Uplink Volume	/roamingQBCInformation/ uplinkVolume
Downlink Volume	Downlink Volume	/roamingQBCInformation/ downlinkVolume
Local Sequence Number	Local Sequence Number	/roamingQBCInformation/ localSequenceNumber
QFI Container information	QFI Container information	/roamingQBCInformation/ qFIContainerInformation
QoS Flow Id	QoS Flow Id	/roamingQBCInformation/ qFIContainerInformation/qFI
Time of First Usage	Time of First Usage	/roamingQBCInformation/ qFIContainerInformation/ timeofFirstUsage
Time of Last Usage	Time of Last Usage	/roamingQBCInformation/ qFIContainerInformation/ timeofLastUsage
QoS Information	QoS Information	/roamingQBCInformation/ qFIContainerInformation/ qoSInformation
User Location Information	User Location Information	/roamingQBCInformation/ qFIContainerInformation/ userLocationInformation

UE Time Zone	UE Time Zone	/roamingQBCInformation/ qFIContainerInformation/ uetimeZone
Presence Reporting Area Information	Presence Reporting Area Information	/roamingQBCInformation/ qFIContainerInformation/ presenceReportingAreaInformation
RAT Type	RAT Type	/roamingQBCInformation/ qFIContainerInformation/ rATType
Report Time	Report Time	/roamingQBCInformation/ qFIContainerInformation/reportTime
Serving Network Function ID	Serving Network Function ID	/roamingQBCInformation/ qFIContainerInformation/ servingNetworkFunctionID
3GPP PS Data Off Status	3GPP PS Data Off Status	/roamingQBCInformation/ qFIContainerInformation/3gppPSDataOffStatus
UPF ID	UPF ID	/roamingQBCInformation
Roaming Charging Profile	Roaming Charging Profile	/roamingQBCInformation
Trigger	Trigger	/roamingQBCInformation/trigger
Partial record method	Partial record method	/roamingQBCInformation/partialRecordMethod

8 Security

Security aspects for service based interface shall be supported as specified in subclause 13 of 3GPP TS 33.501 [390].

Annex A (normative): OpenAPI specification

A.1 General

The present Annex contains an OpenAPI [500] specification of HTTP messages and content bodies used by the Nchf_ConvergedCharging API.

A.2 Nchf_ ConvergedCharging API

```
openapi: 3.0.0
info:
  description: ConvergedCharging Service
  version: 1.R15.0.0
  title: Nchf_ConvergedCharging
externalDocs:
  description: >-
    3GPP TS 32.291 V1.0.0 (2018-09) Telecommunication management; Charging
    management; 5G system, Charging service;stage 3 version 15.0.0
  url: 'http://www.3gpp.org/ftp/Specs/archive/32_series/32.291/'
servers:
  - url: 'https://{apiRoot}/Nchf_ConvergedCharging/v1'
    variables:
      apiRoot:
        default: demohost.com
        description: >-
          apiRoot as defined in subclause subclause 4.4 of 3GPP TS 29.501,
          excluding the http:// part
paths:
  /chargingdata:
    post:
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ChargingDataRequest'
      responses:
        '201':
          description: Created
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ChargingDataResponse'
        '400':
          description: Bad request
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '403':
          description: Forbidden
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '404':
          description: Not Found
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      callbacks:
        myNotification:
          '{$request.body#/notifyUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
```

```
                $ref: '#/components/schemas/ChargingNotification'
            responses:
              '204':
                description: 'No Content, Notification was succesfull'
              '400':
                description: Bad request
                content:
                  application/json:
                    schema:
                      $ref: >-
                        TS29571_CommonData.yaml#/components/schemas/ProblemDetails
              default:
                $ref: 'TS29571_CommonData.yaml#/components/responses/default'
'/chargingdata/{ChargingDataRef}/update':
  post:
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ChargingDataRequest'
    parameters:
      - name: ChargingDataRef
        in: path
        description: a unique identifier for a charging data resource in a PLMN
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK. Updated Charging Data resource is returned
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ChargingDataResponse'
      '400':
        description: Bad request
        content:
          application/json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      '403':
        description: Forbidden
        content:
          application/json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      '404':
        description: Not Found
        content:
          application/json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
'/chargingdata/{ChargingDataRef}/release':
  post:
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ChargingDataRequest'
    parameters:
      - name: ChargingDataRef
        in: path
        description: a unique identifier for a charging data resource in a PLMN
        required: true
        schema:
          type: string
    responses:
      '204':
        description: No Content.
      '404':
        description: Not Found
        content:
          application/json:
            schema:
```

```
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
components:
  schemas:
    ChargingDataRequest:
      type: object
      properties:
        subscriberIdentifier:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        nfConsumerIdentification:
          $ref: '#/components/schemas/NFConsumerIdentification'
        invocationTimeStamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        invocationSequenceNumber:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        notifyUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        multipleUnitUsage:
          type: array
          items:
            $ref: '#/components/schemas/MultipleUnitUsage'
          minItems: 0
        triggers:
          type: array
          items:
            $ref: '#/components/schemas/Trigger'
          minItems: 0
        pDUSessionChargingInformation:
          $ref: '#/components/schemas/PDUSessionChargingInformation'
        roamingQBCInformation:
          $ref: '#/components/schemas/RoamingQBCInformation'
      required:
        - nfConsumerIdentification
        - invocationTimeStamp
        - invocationSequenceNumber
    ChargingDataResponse:
      type: object
      properties:
        invocationTimeStamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        invocationSequenceNumber:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        invocationResult:
          $ref: '#/components/schemas/InvocationResult'
        sessionFailover:
          $ref: '#/components/schemas/SessionFailover'
        multipleQuotaInformation:
          type: array
          items:
            $ref: '#/components/schemas/MultipleQuotaInformation'
          minItems: 0
        triggers:
          type: array
          items:
            $ref: '#/components/schemas/Trigger'
          minItems: 0
        pDUSessionChargingInformation:
          $ref: '#/components/schemas/PDUSessionChargingInformation'
        roamingQBCInformation:
          $ref: '#/components/schemas/RoamingQBCInformation'
      required:
        - invocationTimeStamp
        - invocationSequenceNumber
        - invocationResult
    ChargingNotification:
      type: object
      properties:
        notificationType:
          $ref: '#/components/schemas/NotificationType'
        reauthorizationDetails:
          type: array
          items:
            $ref: '#/components/schemas/ReauthorizationDetails'
          minItems: 0
      required:
        - notificationType
    NFConsumerIdentification:
```

```
    type: object
    properties:
      nFName:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
      nFIPv4Address:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
      nFIPv6Address:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      nFPLMNID:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
      nodeFunctionality:
        $ref: '#/components/schemas/NodeFunctionality'
    required:
      - nFName
      - nFIPv4Address
      - nFIPv6Address
      - nodeFunctionality
  MultipleUnitUsage:
    type: object
    properties:
      ratingGroup:
        $ref: '#/components/schemas/RatingGroupId'
      requestedUnit:
        $ref: '#/components/schemas/RequestedUnit'
      UsedUnitContainer:
        type: array
        items:
          $ref: '#/components/schemas/UsedUnitContainer'
        minItems: 0
      uPFID:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    required:
      - ratingGroup
  InvocationResult:
    type: object
    properties:
      error:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      failureHandling:
        $ref: '#/components/schemas/FailureHandling'
    required:
      - error
  Trigger:
    type: object
    properties:
      triggerType:
        $ref: '#/components/schemas/TriggerType'
      category:
        $ref: '#/components/schemas/TriggerCategory'
      timeLimit:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      volumeLimit:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      maxNumberOfccc:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    required:
      - triggerType
      - TriggerCategory
  MultipleQuotaInformation:
    type: object
    properties:
      resultCode:
        $ref: '#/components/schemas/ResultCode'
      ratingGroup:
        $ref: '#/components/schemas/RatingGroupId'
      grantedUnit:
        $ref: '#/components/schemas/GrantedUnit'
      triggers:
        type: array
        items:
          $ref: '#/components/schemas/Trigger'
        minItems: 0
      validityTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      quotaHoldingTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      finalUnitIndication:
        $ref: '#/components/schemas/FinalUnitIndication'
```

```
      timeQuotaThreshold:
        type: integer
      volumeQuotaThreshold:
        type: integer
      unitQuotaThreshold:
        type: integer
      uPFID:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    required:
      - ratingGroup
  RequestedUnit:
    type: object
    properties:
      time:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      totalVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      uplinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      downlinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      serviceSpecificUnits:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
  UsedUnitContainer:
    type: object
    properties:
      serviceId:
        $ref: '#/components/schemas/ServiceId'
      quotaManagementIndicator:
        $ref: '#/components/schemas/QuotaManagementIndicator'
      triggers:
        type: array
        items:
          $ref: '#/components/schemas/Trigger'
        minItems: 0
      triggerTimestamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      time:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      totalVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      uplinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      downlinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      serviceSpecificUnits:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      eventTimeStamps:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      localSequenceNumber:
        type: integer
      pDUContainerInformation:
        $ref: '#/components/schemas/PDUContainerInformation'
    required:
      - localSequenceNumber
  GrantedUnit:
    type: object
    properties:
      tariffTimeChange:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      time:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      totalVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      uplinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      downlinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      serviceSpecificUnits:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
  FinalUnitIndication:
    type: object
    properties:
      finalUnitAction:
        $ref: '#/components/schemas/FinalUnitAction'
      restrictionFilterRule:
        $ref: '#/components/schemas/IPFilterRule'
      filterId:
```

```
        type: string
      redirectServer:
        $ref: '#/components/schemas/RedirectServer'
    required:
      - finalUnitAction
  RedirectServer:
    type: object
    properties:
      redirectAddressType:
        $ref: '#/components/schemas/RedirectAddressType'
      redirectServerAddress:
        type: string
    required:
      - redirectAddressType
      - redirectServerAddress
  ReauthorizationDetails:
    type: object
    properties:
      serviceIdentifier:
        $ref: '#/components/schemas/ServiceId'
      ratingGroup:
        $ref: '#/components/schemas/RatingGroupId'
      quotaManagementIndicator:
        $ref: '#/components/schemas/QuotaManagementIndicator'
    required:
      - ratingGroup
  PDUSessionChargingInformation:
    type: object
    properties:
      chargingId:
        type: string
      userInformation:
        $ref: '#/components/schemas/UserInformation'
      userLocationinfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      userLocationTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29512_CommonData.yaml#/components/schemas/PraInfo'
        minProperties: 0
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      pduSessionInformation:
        $ref: '#/components/schemas/PDUSessionInformation'
      unusedQuotaTimer:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    required:
      - userInformation
      - pduSessionInformation
  UserInformation:
    type: object
    properties:
      servedGPSI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      servedPEI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
      unauthenticatedFlag:
        type: boolean
      roamerInOut:
        $ref: '#/components/schemas/RoamerInOut'
    required:
      - servedGPSI
  PDUSessionInformation:
    type: object
    properties:
      networkSlicingInfo:
        $ref: '#/components/schemas/NetworkSlicingInfo'
      pduSessionID:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
      pduType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
      sscMode:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SscMode'
      hPlmnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
      servingNodeID:
```

```
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AmfId'
        minItems: 0
      servingNetworkFunctionID:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ServingNetworkFunctionID'
      ratType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      dnnId:
        type: string
      chargingCharacteristics:
        type: string
      chargingCharacteristicsSelectionMode:
        $ref: '#/components/schemas/ChargingCharacteristicsSelectionMode'
      startTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      stopTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      3gppPSDataOffStatus:
        $ref: '#/components/schemas/3GPPPSDataOffStatus'
      sessionStopIndicator:
        type: boolean
      pduAddress:
        $ref: '#/components/schemas/PDUAddress'
      diagnostics:
        $ref: '#/components/schemas/Diagnostics'
      qoSInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DefaultQosInformation'
      servingCNPlmnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    required:
      - pduSessionID
      - dnnId
  PDUContainerInformation:
    type: object
    properties:
      timeofFirstUsage:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      timeofLastUsage:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      qoSInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DefaultQoSInformation'
      aFCorrelationInformation:
        type: string
      userLocationInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      rATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      servingNodeID:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AmfId'
        minItems: 0
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29512_CommonData.yaml#/components/schemas/PraInfo'
        minProperties: 0
      3gppPSDataOffStatus:
        $ref: '#/components/schemas/3GPPPSDataOffStatus'
      sponsorIdentity:
        type: string
      applicationserviceProviderIdentity:
        type: string
      chargingRuleBaseName:
        type: string
  NetworkSlicingInfo:
    type: object
    properties:
      sNSSAI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    required:
      - sNSSAI
  PDUAddress:
    type: object
    properties:
```

```
      pduIPv4Address:
        $ref: 'TS29514_CommonData.yaml#/components/schemas/Ipv4Addr'
      pduIPv6Address:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      pduAddressprefixlength:
        type: integer
      IPv4dynamicAddressFlag:
        type: boolean
      IPv6dynamicAddressFlag:
        type: boolean
  ServingNetworkFunctionID:
    type: object
    properties:
      servingNetworkFunctionName:
        type: string
      servingNetworkFunctionInstanceid:
        type: string
  RoamingQBCInformation:
    type: object
    properties:
      multipleQFIcontainer:
        type: array
        items:
          $ref: '#/components/schemas/MultipleQFIcontainer'
        minItems: 0
      uPFID:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
      roamingChargingProfile:
        $ref: '#/components/schemas/RoamingChargingProfile'
  MultipleQFIcontainer:
    type: object
    properties:
      triggers:
        type: array
        items:
          $ref: '#/components/schemas/Trigger'
        minItems: 0
      triggerTimestamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      time:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      totalVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      uplinkVolume:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      localSequenceNumber:
        type: integer
      qFIContainerInformation:
        $ref: '#/components/schemas/QFIContainerInformation'
    required:
      - localSequenceNumber
  QFIContainerInformation:
    type: object
    properties:
      qFI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
      timeofFirstUsage:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      timeofLastUsage:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      qoSInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DefaultQoSInformation'
      userLocationInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29512_CommonData.yaml#/components/schemas/PraInfo'
        minProperties: 0
      rATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      servingNetworkFunctionID:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AmfId'
        minItems: 0
```

```
    3gppPSDataOffStatus:
      $ref: '#/components/schemas/3GPPPSDataOffStatus'
RoamingChargingProfile:
  type: object
  properties:
    triggers:
      type: array
      items:
        $ref: '#/components/schemas/Trigger'
      minItems: 0
    partialRecordMethod:
      $ref: '#/components/schemas/PartialRecordMethod'
RatingGroupId:
  type: integer
ServiceId:
  type: integer
Diagnostics:
  type: integer
IPFilterRule:
  type: string
NotificationType:
  anyOf:
    - type: string
      enum:
        - REAUTHORIZATION
        - ABORT_CHARGING
    - type: string
NodeFunctionality:
  anyOf:
    - type: string
      enum:
        - SMF
    - type: string
ChargingCharacteristicsSelectionMode:
  anyOf:
    - type: string
      enum:
        - HOME_DEFAULT
        - ROAMING_DEFAULT
        - VISITING_DEFAULT
    - type: string
TriggerType:
  anyOf:
    - type: string
      enum:
        - QUOTA_THRESHOLD
        - QHT
        - FINAL
        - QUOTA_EXHAUSTED
        - VALIDITY_TIME
        - OTHER_QUOTA_TYPE
        - FORCED_REAUTHORISATION
        - UNUSED_QUOTA_TIMER
        - ABNORMAL_RELEASE
        - QOS_CHANGE
        - VOLUME_LIMIT
        - TIME_LIMIT
        - PLMN_CHANGE
        - USER_LOCATION_CHANGE
        - RAT_CHANGE
        - UE_TIMEZONE_CHANGE
        - TARIFF_TIME_CHANGE
        - MAX_NUMBER_OF_CHANGES_IN CHARGING_CONDITIONS
        - MANAGEMENT_INTERVENTION
        - CHANGE_OF_UE_PRESENCE_IN PRESENCE_REPORTING_AREA
        - CHANGE_OF_3GPP_PS_DATA_OFF_STATUS
        - SERVING_NODE_CHANGE
        - REMOVAL_OF_UPF
        - ADDITION_OF_UPF
    - type: string
FinalUnitAction:
  anyOf:
    - type: string
      enum:
        - TERMINATE
        - REDIRECT
        - RESTRICT_ACCESS
    - type: string
```

```
    RedirectAddressType:
      anyOf:
        - type: string
          enum:
            - IPV4
            - IPV6
            - URL
        - type: string
    TriggerCategory:
      anyOf:
        - type: string
          enum:
            - IMMEDIATE_REPORT
            - DEFERRED_REPORT
        - type: string
    QuotaManagementIndicator:
      anyOf:
        - type: string
          enum:
            - ONLINE_CHARGING
            - OFFLINE_CHARGING
        - type: string
    FailureHandling:
      anyOf:
        - type: string
          enum:
            - TERMINATE
            - CONTINUE
            - RETRY_AND_TERMINATE
        - type: string
    SessionFailover:
      anyOf:
        - type: string
          enum:
            - FAILOVER_NOT_SUPPORTED
            - FAILOVER_SUPPORTED
        - type: string
    3GPPPSDataOffStatus:
      anyOf:
        - type: string
          enum:
            - ACTIVE
            - INACTIVE
        - type: string
    ResultCode:
      anyOf:
        - type: string
          enum:
            - END_USER_SERVICE_DENIED
            - CREDIT_CONTROL_NOT_APPLICABLE
            - CREDIT_LIMIT_REACHED
            - AUTHORIZATION_REJECTED
            - USER_UNKNOWN
            - RATING_FAILED
        - type: string
    PartialRecordMethod:
      anyOf:
        - type: string
          enum:
            - DEFAULT
            - INDIVIDUAL
        - type: string
    RoamerInOut:
      anyOf:
        - type: string
          enum:
            - IN_BOUND
            - OUT_BOUND
        - type: string
```

Annex B (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2018-02	SA5 #117	S5-181414 S5-181413				Update of the skeleton Protocols aspects	0.1.0
2018-04	SA5 #118	S5-182361 S5-182362				Converged charging service definition Nchf_ConvergedCharging Service API Definition	0.2.0
2018-05	SA5 #119	S5-183230 S5-183491 S5-183492 S5-183494 S5-183493				Remove PATCH usage for Nchf_ ConvergedCharging Service API Scope and Reference Bindings of CDR parameter, Information Element and Attribute Data Type Definition Notification API Definition	0.3.0
2018-06	SA5 #119 Ad hoc	S5-184016 S5-184126 S5-184139 S5-184152 S5-184291 S5-184292 S5-184293 S5-184294 S5-184295				Update the category of charging attributes Use of Feature negotiation Introduce OpenAPI Annex Addition to Usage of HTTP Proposal on Nchf_ ConvergedCharging Service APIs Proposal on Service Definition Update of Service Definition Proposal on Message Flow of the Service Operation Service API Introduction proposal	0.4.0
2018-08	SA5 #120	S5-185229 S5-185230 S5-185231 S5-185397 S5-185246 S5-185398 S5-185399 S5-185321 S5-185465 S5-185251 S5-185467 S5-185468 S5-185466				Update for template alignment Introduce clause 5.1 Use of Feature negotiation Reference Editor's Note Clear up Error handling Update of Resource Standard Methods Update of Service Operations Update of Bindings Security Introduce New data types for roaming QBC Open API Update of Data Model	0.5.0
2018-09	SA#81	SP-180800				Presented for information and approval	1.0.0
2018-09	SA#81					Upgrade to change control version	15.0.0

History

Document history		
V15.0.0	October 2018	Publication