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Contents

Foreword

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

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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 charging is specified in TS 32.255 [30].
- The 5G connection and mobility charging is specified in TS 32.256 [31].
- The service, operations and procedures of 5G charging for service based interface is specified in TS 32.290 [58].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition of the 5G System are specified in 3GPP TS 29.500 [299] and 3GPP TS 29.501 [300].

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[2] - [13] Void.

[14] 3GPP TS 32.254: "Telecommunication management; Charging management; Exposure function Northbound Application Program Interfaces (APIs) charging ".

[15] - [28] Void.

[29] 3GPP TS 32.274: "Telecommunication management; Charging management;Short Message Service (SMS) charging".

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

[31] 3GPP TS 32.256: "Telecommunication management; Charging management; 5G connection and mobility domain charging; stage 2".

[32] - [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).

[59] - [69] Void.[70] 3GPP TS 28.201: "Charging management; Network slice performance and analytics charging in the 5G System (5GS); Stage 2".

[71] 3GPP TS 28.202: "Charging management; Network slice management charging in the 5G System (5GS); Stage 2".

[72] - [99] Void.

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

[101] 3GPP TR 21.900: "Technical Specification Group working methods".

[102] - [199] Void

[200] - [252] Void

[253] 3GPP TS 28.532: "Management and orchestration; Management services".

[254] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[255] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[256] 3GPP TS 28.554: "Management and orchestration;5G end to end Key Performance Indicators (KPI)".

[257] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

[258] - [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] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[303] 3GPP TS 24.501: "Non-Access-Stratum (NAS) Protocol for 5G System (5GS); Stage 3".

[304] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[305] 3GPP TS 29.510: "Network Function Repository Services; Stage 3".

[306] 3GPP TS 29.520: "5G System; Network Data Analytics Services;Stage 3".

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

[404] - [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 [100].

3.2 Symbols

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

Nchf Service based interface exhibited by CHF.

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].

AF	Application Function
AMF	Access and Mobility Management Function
ATSSS	Access Traffic Steering, Switching, Splitting
CHF	Charging Function
CEF	Charging Enablement Function
CTF	Charging Trigger Function
GPSI	Generic Public Subscription Identifier
GUAMI	Globally Unique AMF Identifier
I-SMF	Intermediate SMF
NF	Network Function
PEI	Permanent Equipment Identifier
QBC	QoS flow Based Charging
QFI	QoS Flow Identifier
SMSF	Short Message Service Function
SMF	Session Management Function
SSC	Session and Service Continuity
SUPI	Subscription Permanent Identifier

4 Overview

4.1 Service architecture

The Converged Charging Service or Offline Only Charging Service is provided by the CHF to the consumer and shown in the SBI representation model in figure 4.1.1.

The ConvergedCharging Service (Nchf_ ConvergedCharging) or Offline Only Charging Service (Nchf_OfflineOnlyCharging) is part of the Nchf service-based interface exhibited by the Charging Function (CHF). The list of NF Service Consumer(s) is provided in Table 5.1-1.

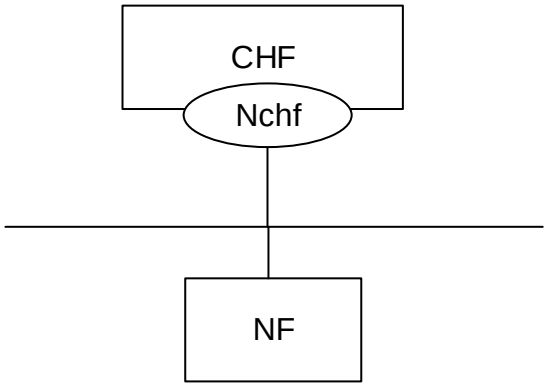

Figure 4.1.1: Reference Architecture for the Nchf_ConvergedCharging Service; SBI representation

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, SMSF, AMF, CEF, MnS Producer
Nchf_OfflineOnlyCharging service	This service provides an offline only charging for session based NF service.	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 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, Unit Count Inactivity 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]
	One Time request for the service.		Charging Data Request/Response [Event]
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	Charging Notify Request/Response

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 charging data resource.

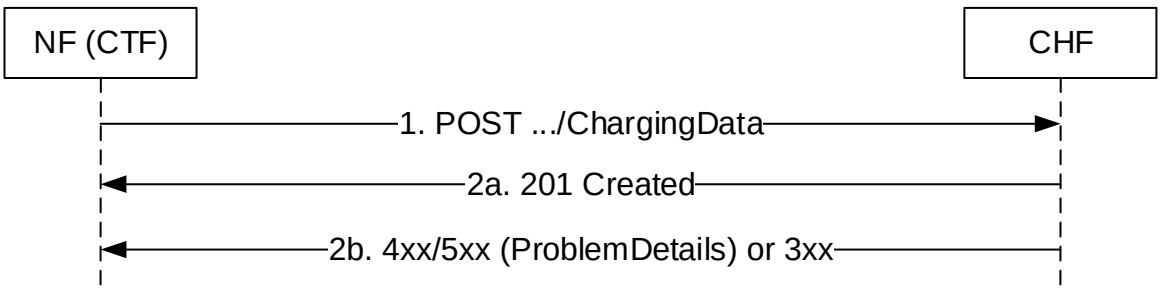

Figure 5.2.2.2-1: Nchf_ ConvergedCharging_Create Service Operation

1. NF (CTF) sends a Nchf_ConvergedCharging_Create request to the CHF to create resource for 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

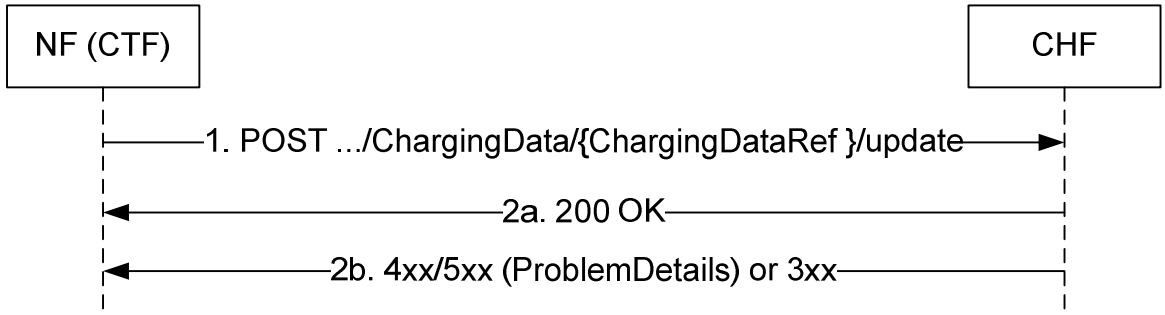

Figure 5.2.2.3-1: Nchf_ConvergedCharging_Update Service Operation

1. NF (CTF) sends a Nchf_ConvergedCharging_Update request to the CHF. The {ChargingDataRef } 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 unit count inactivity timer in NF Consumer.
- Abort notification is received from CHF.

- Service termination in NF Consumer.

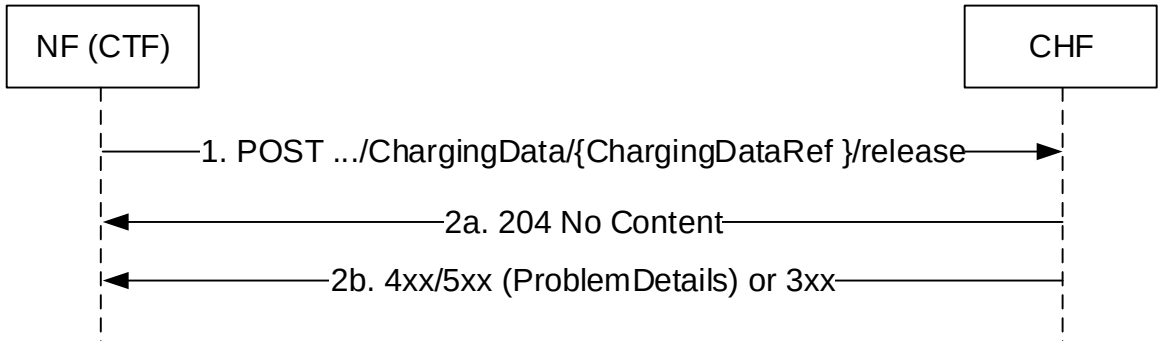

Figure 5.2.2.4-1: Nchf_ConvergedCharging_Release Service Operation

1. NF(CTF) sends a Nchf_ConvergedCharging_Release request to the CHF. The {ChargingDataRef } 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.

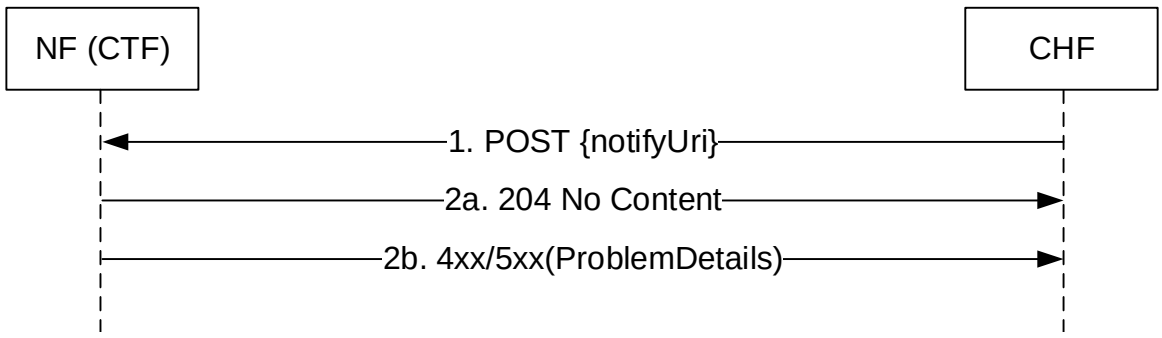

Figure 5.2.2.5-1: Nchf_ConvergedCharging_Notify Service Operation

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, "204 No Content" 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.

After successful operation, when the NF Service Consumer receives a Charging Notify Request while not waiting for any Charging Data Response from the CHF, CTF can send a new Charging Data Request.

5.3 Nchf_OfflineOnlyCharging service

5.3.1 Service description

This service provides charging in offline only charging scenario by the CHF to the NF service consumer (i.e. SMF) as defined in subclause 6.5 in 3GPP TS 32.290 [58].

It includes the following functionalities:

- Create resource at service establishment based on the request from NF consumer;
- During the service consumption lifecycle, update resource based on the request from NF consumer;
- Release upon service termination;
- Charging information record generation.

5.3.2 Service Operations

5.3.2.1 Introduction

The service operations defined for Nchf_OfflineOnlyCharging are shown in table 5.3.2.1-1.

Table 5.3.2.1-1: Nchf_OfflineOnlyCharging Operations

Service Operation Name	Description	Initiated by	Corresponding Offline only charging messages in 3GPP TS 32.290[58]
Nchf_OfflineOnlyCharging_Create	Initial report of service usage.	NF consumer	Charging Data Request/Response [Initial]
Nchf_OfflineOnlyCharging_Update	Intermediate report of service usage.	NF consumer	Charging Data Request/Response [Update]
Nchf_OfflineOnlyCharging_Release	Last report of service usage.	NF consumer	Charging Data Request/Response [Termination]

5.3.2.2 Nchf_OfflineOnlyCharging_Create Operation

The Nchf_OfflineOnlyCharging_Create operation provides means for NF (CTF) to request initial report of service usage.

The following procedures using the Nchf_OfflineOnlyCharging_Create service operation are supported:

- No existing charging data resource.

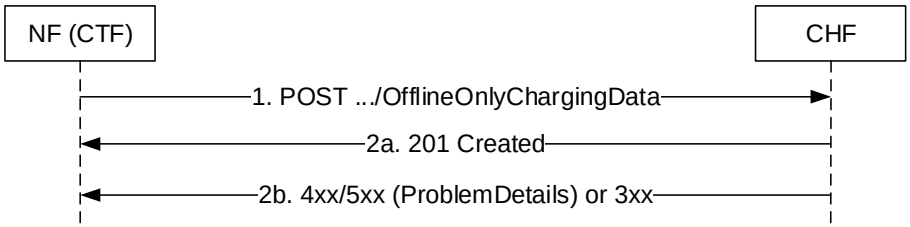

Figure 5.3.2.2-1: Nchf_OfflineOnlyCharging_Create Service Operation

1. NF (CTF) sends a Nchf_OfflineOnlyCharging_Create request to the CHF to create resource for starting charging.

2a. At successful operation, "201 Created" response is returned. In the "201 Created" response, the CHF includes a Location header field 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 6.2.3.2.3.1-3 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 6.2.7.3-1.

5.3.2.3 Nchf_OfflineOnlyCharging_Update Operation

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

The following procedures using the Nchf_OfflineOnlyCharging_Update service operation are supported:

- charging events occur.

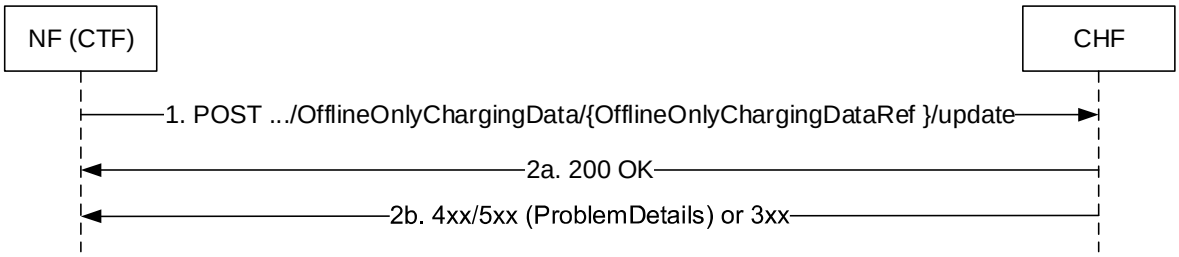

Figure 5.3.2.3-1: Nchf_OfflineOnlyCharging_Update Service Operation

1. NF (CTF) sends a Nchf_OfflineOnlyCharging_Update request to the CHF. The {OfflineChargingDataRef} in the URI identifies the "Offline Only Charging Data" to be updated. The used service unit is included in the request body.

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

2b. On failure or redirection, one of the HTTP status code listed in Table 6.2.3.3.4.2.2-2 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 6.2.7.3-1.

5.3.2.4 Nchf_OfflineOnlyCharging_Release Operation

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

The following procedures using the Nchf_OfflineOnlyCharging_Release service operation are supported.

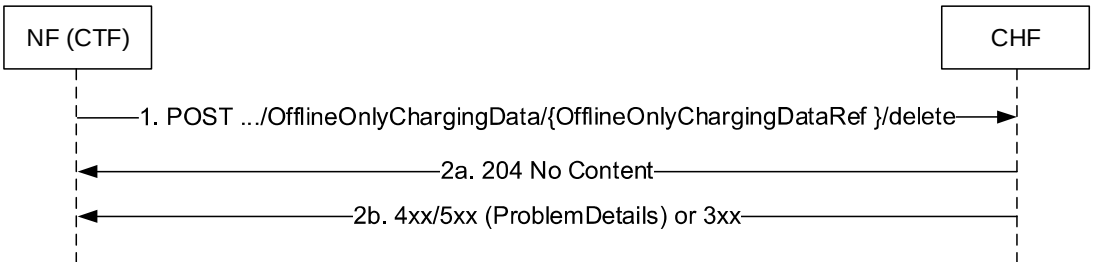

Figure 5.3.2.4-1: Nchf_OfflineOnlyCharging_Release Service Operation

1. NF(CTF) sends a Nchf_OfflineOnlyCharging_Release request to the CHF. The {OfflineChargingDataRef} in the URI identifies the "Offline Only 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 6.2.3.3.4.3.2-2 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 6.2.7.3-1.

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 "v3".
- 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

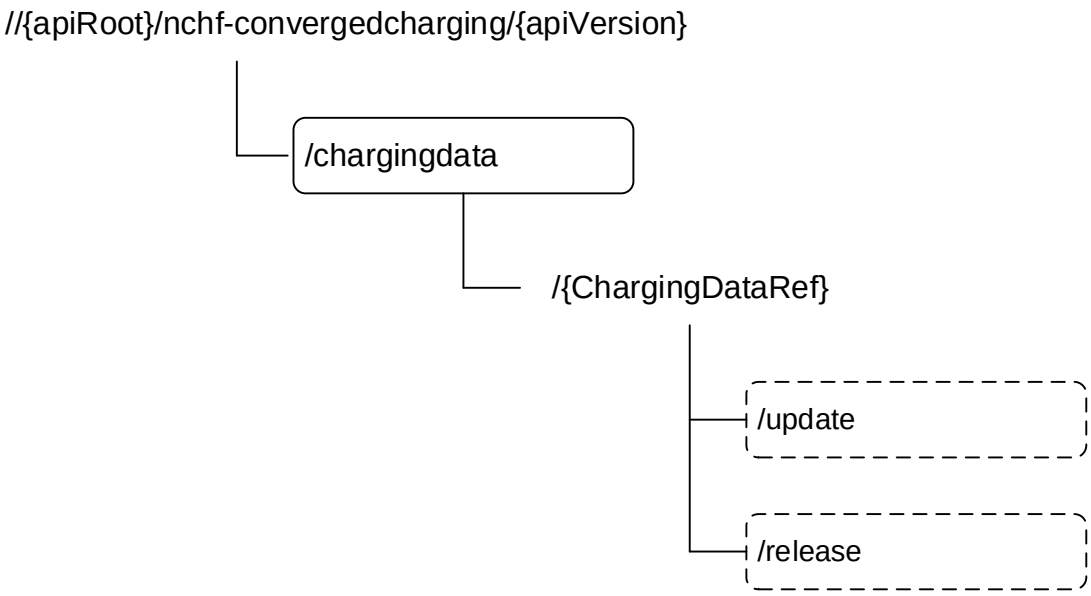

Figure 6.1.3.1-1: Resource URI structure of the Nchf_ConvergedCharging API

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/ {apiVersion}/chargingdata/	POST	Create a new Charging Data resource	Nchf_ ConvergedCharging_Create
Individual Charging Data	{apiRoot}/ nchf-convergedcharging/{apiVersion}/ chargingdata/{ChargingDataRef }/update	update (POST)	Update an existing Charging Data resource.	Nchf_ ConvergedCharging_Update
	{apiRoot}/ nchf-convergedcharging/{apiVersion}/ chargingdata /{ChargingDataRef}/release	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**/{apiVersion}/**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.
n/a			307 Temporary Redirect	(NOTE 2)
ChargingDataResponse	M	1	400 Bad Request	(NOTE 2)
ChargingDataResponse	M	1	403 Forbidden	(NOTE 2)
ChargingDataResponse	M	1	404 Not Found	(NOTE 2)
n/a			405 Method Not Allowed	(NOTE 2)
n/a			408 Request Timeout	(NOTE 2)
n/a			410 Gone	(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 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/{apiVersion} /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 operation URI	Mapped HTTP method	Description
{apiRoot}/ nchf-convergedcharging/{apiVersion}/ chargingdata/{ChargingDataRef }/update	POST	Update an existing Charging Data resource.
{apiRoot}/ nchf-convergedcharging/{apiVersion}/ 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.
n/a			307 Temporary Redirect	(NOTE 2)
ChargingDataResponse	M	1	400 Bad Request	(NOTE 2)
ChargingDataResponse	M	1	403 Forbidden	(NOTE 2)
ChargingDataResponse	M	1	404 Not Found	(NOTE 2)
n/a			405 Method Not Allowed	(NOTE 2)
n/a			408 Request Timeout	(NOTE 2)
n/a			410 Gone	(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 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			204 No Content	Successful case: The Charging Data resource matching the ChargingDataRef is modified and then released.
ChargingDataResponse	M	1	404 Not Found	(NOTE 2)
n/a			410 Gone	(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] 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
ChargingNotifyRequest	M	1	Provides Information about active Charging events. ChargingNotifyRequest 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.
ChargingNotifyResponse	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 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 NF consumer 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.	
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.	
ChargingNotifyRequest	6.1.6.2.1.3	Describes Notifications about events that occurred in request message.	
ChargingNotifyResponse	6.1.6.2.1.16	Describes the response of notification.	

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, GLI, GCI). (NOTE 1)	
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]	String providing an URI	
AccessType	3GPP TS 29.571 [371]	The identification of the type of access network.	
DateTime	3GPP TS 29.571 [371]	The time.	
ChargingId	3GPP TS 29.571 [371]	Charging identifier allowing correlation of charging information	
RatType	3GPP TS 29.571 [371]	The identification of the RAT type.	
RatingGroup	3GPP TS 29.571 [371]	The identification of the rating group	
Ipv4Addr	3GPP TS 29.571 [371]	Ipv4 address.	
Ipv6Prefix	3GPP TS 29.571 [371]	The Ipv6 prefix allocated for the user.	
Ipv6Addr	3GPP TS 29.571 [371]	Ipv6 Address.	
Pei	3GPP TS 29.571 [371]	The Identification of a Permanent Equipment.	
TimeZone	3GPP TS 29.571 [371]	Time zone information	
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.	
SubscribedDefaultQos	3GPP TS 29.571 [371]	subscribed default QoS.	
AuthorizedDefaultQos	3GPP TS 29.512 [302]	Authorized default QoS.	
Ambr	3GPP TS 29.571 [371]	Aggregate Maximum Bit rate	
QosData	3GPP TS 29.512 [302]	Contains QoS parameters	
UserLocation	3GPP TS 29.571 [371]	User location information	
PlmnId	3GPP TS 29.571 [371]	PLMN id	
Guami	3GPP TS 29.571 [371]	Globally Unique AMF Identifier	
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	
ServiceId	3GPP TS 29.571 [371]	Identifier of service	

SscMode	3GPP TS 29.571 [371]	SSC Mode type	
PresenceInfo	3GPP TS 29.571 [371]	PRA information including PRAId, PRA element list and PRA status	
Qfi	3GPP TS 29.571 [371]	QoS flow identifier designated as "Qfi".	
AmfId	3GPP TS 29.571 [371]	AMF identifier	
Dnn	3GPP TS 29.571 [371]	Data Network Name	
GroupId	3GPP TS 29.571 [371]	Identifies a group	
Bytes	3GPP TS 29.571 [371]	String with format "byte"	
Tai	3GPP TS 29.571 [371]	Tracking Area Identifier	
Area	3GPP TS 29.571 [371]	List of TACs or Operator specific codes	
CoreNetworkType	3GPP TS 29.571 [371]	5GC or EPC	
ServiceAreaRestriction	3GPP TS 29.571 [371]	Service Area restriction	
GlobalRanNodeId	3GPP TS 29.571 [371]	Global RAN Node Id	
QosCharacteristics	3GPP TS 29.512 [302]	Map of QoS characteristics for non standard 5QIs and non-preconfigured 5QIs.	
SupportedFeatures	3GPP TS 29.571 [371]	See 3GPP TS 29.500 [4] clause 6.6	
NsiLoadLevelInfo	3GPP TS 29.520 [306]	Represents the load level information for an S-NSSAI and the associated network slice instance	
ServiceExperienceInfo	3GPP TS 29.520 [306]	ServiceExperience	
ApplicationChargingId	3GPP TS 29.571 [371]	Application provided charging identifier allowing correlation of charging information.	AF_Charging_Identifier
SharingLevel	3GPP TS 28.541 [254]	Ressources sharing level	
MobilityLevel	3GPP TS 28.541 [254]	UE mobility Level	
SsT	3GPP TS 28.541 [254]	Slice Service type (SST)	
Support	3GPP TS 28.541 [254]	Supported, Not Supported indicator	
Float	3GPP TS 29.571 [371]	Number with format "float"	
MaPduIndication	3GPP TS 29.512 [302]	MA PDU session indication	ATSSS
AtsssCapability	3GPP TS 29.571 [371]	ATSSS capabilities	ATSSS
SteeringFunctionality	3GPP TS 29.571 [371]	Steering functionalities for MA PDU session	ATSSS
SteeringMode	3GPP TS 29.512 [302]	Steering mode for MA PDU session	ATSSS
OperationalState	3GPP TS 28.623 [257]	Operational state	
AdministrativeState	3GPP TS 28.623 [257]	Administrative state	

NOTE 1: A SUPI containing GLI or GCI is used to support 5G-RG and FN-RG in scenarios of wireline network.

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	Identifier of the subscriber that uses the requested service.	
nfConsumerIdentification	NFIdentification	M	1	This is a grouped field which contains a set of information identifying the NF consumer of the charging service.	
invocationTimeStamp	DateTime	M	1	The time at which the request is send	
invocationSequenceNumber	Uint32	M	1	This field contains the sequence number of the charging service invocation by the NF consumer.	
retransmissionIndicator	boolean	O_C	0..1	This field indicates, if included, this is a retransmitted request message.	
oneTimeEvent	boolean	O_C	0..1	Indicates, if included, that this is event based charging and whether this is a one-time event. If true, this is a one-time event that there will be no update or release.	
oneTimeEventType	EventType	O_C	0..1	indicates the type of the one time event, i.e. Immediate or Post event charging.	
notifyUri	Uri	O_C	0..1	Identifies the recipient of Notifications sent by the CHF. In case of session based charging it shall be present in create request message, and may be present in update.	
supportedFeatures	SupportedFeatures	O_C	0..1	This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported.	
serviceSpecificationInfo	String	O_C	0..1	Identifies service specific document that applies to the request, e.g. the service specific document ('middle tier' TS) and 3GPP release the service specific document is based upon.	
multipleUnitUsage	array(MultipleUnitUsage)	O_C	0..N	This field contains the parameters for the quota management request and/or usage reporting.	
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 timestamp of the charging service response from the CHF.	
invocationResult	InvocationResult	O_C	0..1	This field holds the result of charging service invocation by the NF consumer	
invocationSequenceNumber	Uint32	M	1	This field contains the sequence number of the charging service invocation by the NF consumer.	
sessionFailover	SessionFailover	O_C	0..1	This field indicates whether alternative CHF is supported for ongoing charging service failover handling by NF consumer.	
supportedFeatures	SupportedFeatures	O_C	0..1	This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported.	
multipleUnitInformation	array(MultipleUnitInformation)	O_C	0..N	This field holds the parameters for the quota management and/or usage reporting information. It may have multiple occurrences.	
triggers	array(Trigger)	O_C	0..N	This field identifies the chargeable event(s) supplied by CHF to override/activate the existing chargeable event(s) in NF consumer. The presence of the triggers attribute without any triggerType is used by CHF to disable all the triggers except rating group level triggers.	

6.1.6.2.1.3 Type ChargingNotifyRequest

Table 6.1.6.2.1.3-1: Definition of type ChargingNotifyRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
notificationType	NotificationType	M	1	Type of notification to indicate re-authorization or termination.	
reauthorizationDetails	array(ReauthorizationDetails)	O_C	0..N	descriptors for re-authorization to determine which quota or usage reporting is updated.	

6.1.6.2.1.4 Type NFIdentification

Table 6.1.6.2.1.4-1: Definition of type NFIdentification

Attribute name	Data type	P	Cardinality	Description	Applicability
nodeFunctionality	NodeFunctionality	M	1	This field contains the function of the node.	
nFName	NfInstanceId	O_C	0..1	Identifier of NF instance. At least one of the nFName or nFIPv4Address or nFIPv6Address shall be present.	
nFIPv4Address	Ipv4Addr	O_C	0..1	The IPv4 address of the NF. At least one of the nFName or nFIPv4Address or nFIPv6Address shall be present.	
nFIPv6Address	Ipv6Addr	O_C	0..1	The IPv6 address of the NF. At least one of the nFName or nFIPv4Address or nFIPv6Address shall be present.	
nFFqdn	string	O_C	0..1	FQDN of the NF	
nFPLMNID	PlmnId	O_C	0..1	This field holds the PLMN ID of the network the NF 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	RatingGroup	M	1	The identifier of a rating group.	
requestedUnit	RequestedUnit	O_C	0..1	This field indicates, if included, that quota management is required. It may additionally contain the amount of requested service units for a particular category.	
usedUnitContainer	array(UsedUnitContainer)	O_C	0..N	This field contains the amount of used non-monetary service units measured.	

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	O_C	0..1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure in case of unsuccessful charging service invocation by the NF consumer. The "invalidParams" attribute of the "ProblemDetails" structure shall contain invalid parameters which caused the rejection.	
failureHandling	FailureHandling	O_C	0..1	This field holds the failure handling to be performed by the NF consumer when charging service invocation is temporarily prevented. The provided value shall always override any already existing value in NF consumer. In case of failure, it indicates which action to be performed by the NF consumer. 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	
triggerCategory	TriggerCategory	M	1	This field indicates whether the charging data generated by the NF consumer for the trigger lead to a Charging Event towards the CHF immediately or not.	
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". This attribute is not valid from Nchf_ ConvergedCharging API version v2.0.0	
volumeLimit64	Uint64	O_C	0..1	Volume limit if trigger type is "Expiry of data volume limit". This attribute replaces the volumeLimit attribute from Nchf_ ConvergedCharging API v2.0.0	
maxNumberOfccc	Uint32	O_C	0..1	Maximum number if trigger type is "Max nb of number of charging condition changes"	

6.1.6.2.1.8 Type MultipleUnitInformation

Table 6.1.6.2.1.8-1: Definition of type MultipleUnitInformation

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	RatingGroup	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	DurationSec	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	Uint64	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.	
NOTE 1: f none of them is included, "RequestedUnit": {}, the category and amount is determined by CHF for online charging with centralized unit determination and rating scenario.					

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	0..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 used time.	
totalVolume	Uint64	O_C	0..1	This field holds the amount of used volume in both uplink and downlink directions.	
uplinkVolume	Uint64	O_C	0..1	This field holds the amount of used volume in uplink direction.	
downlinkVolume	Uint64	O_C	0..1	This field holds the amount of used volume in downlink direction.	
serviceSpecificUnits	Uint64	O_C	0..1	This field holds the amount of used service specific units.	
eventTimeStamps	Array(DateTime)	O_C	0..N	This field holds the timestamps of the event reported in the Service Specific Unit s, if the reported units are event based	
localSequenceNumber	integer	M	1	holds the Used Unit sequence number, i.e. the order when charging event occurs. It starts from 1 and 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 UTC time indicating 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
service	ServiceId	O_C	0..1	identifier for a service	
ratingGroup	RatingGroup	O_C	0..1	identifier of a rating group. This attribute shall be present if serviceIdentifier attribute is present.	
quotaManagementIndicator	QuotaManagementIndicator	O_C	0..1	an indicator on whether the re-authorization notification is for quota management control or not.	

6.1.6.2.1.15 Void

6.1.6.2.1.16 Type ChargingNotifyResponse

Table 6.1.6.2.1.16-1: Definition of type ChargingNotifyResponse

Attribute name	Data type	P	Cardinality	Description	Applicability
invocationResult	InvocationResult	O_C	0..1	This field holds the result of notification.	

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 MultipleUnitUsage 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	identifier of UPF	

6.1.6.2.2.4 Type MultipleUnitInformation

This clause is additional attributes of the type MultipleUnitInformationdefined 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 MultipleUnitInformation

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 portion of 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	ChargingId	O_M	0..1	Charging identifier for correlation between different records of a single PDU session	
homeProvided ChargingId	ChargingId	Oc	0..1	Charging identifier for correlation between H-SMF and V-SMF.	
userInformation	UserInformation	O_M	0..1	including information of user and user equipment,	
userLocationinfo	UserLocation	O_C	0..1	provides information on the location	
mAPDUNon3GPPUserLocationInfo	UserLocation	O_C	0..1	provides information on the location under the non-3GPP access for the MA PDU session	ATSSS
presenceReportingAreaInformation	map(PresenceInfo)	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 "presenceState" attribute within the PresenceInfo 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 PresenceInfo data type shall be the key of the map.	
uetimeZone	TimeZone	O_C	0..1	the UE Timezone the UE is currently located	
pduSessionInformation	PDUSessionInformation	O_C	0..1	PDU session level information, including PDU session ID, PDU type, SSC Mode, QoS, network slicing etc. It needs to be present in the request, but it is optional in the response.	
unitCountInactivityTimer	DurationSec	O_C	0..1	threshold for the time period resource idle Upon the initial interaction with the CHF, the SMF use this attribute to provide pre-configured threshold 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 unit count inactivity timer trigger is active.	
rANSecondaryRATUsageReport	RANSecondaryRATUsageReport	O_C	0..1	Secondary RAT usage reported from RAN.	

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	O_C	0..1	the Generic Public Subscription Identifier (GPSI) of the served party, if available.	
servedPEI	Pei	O_C	0..1	the identification of Permanent Equipment Identifier.	
unauthenticatedFlag	boolean	O_C	0..1	indicates the served SUPI is not authenticated	
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 session	
pduSessionID	PduSessionId	M	1		
pduType	PduSessionType	O_M	0..1	type of the PDU session	
sscMode	SscMode	O_C	0..1	information of SSC Mode type.	
hPlmnId	PlmnId	O_C	0..1	PLMN identifier of the home network	
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 session	
mAPDUNon3GPPRATType	RatType	O_C	0..1	the RAT Type of non-3GPP access for the MA PDU session	ATSSS
dnnId	Dnn	M	1	a Data Network Name	
dnnSelectionMode	DnnSelectionMode	O_C	0..1	This field indicates how the DNN was selected.	
chargingCharacteristics	string	O_C	0..1	the Charging Characteristics for this PDU session. It carries the value in hexadecimal representation Pattern: '^[0-9a-fA-F]{1,4}$'	
chargingCharacteristicsSelectionMode	ChargingCharacteristicsSelectionMode	O_C	0..1	information about how the "Charging Characteristics" was selected.	
startTime	DateTime	O_C	0..1	the UTC time which represents the start of a PDU session at the SMF	
stopTime	DateTime	O_C	0..1	the UTC time 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/prefix	
diagnostics	Diagnostics	O_C	0..1	provides a more detailed cause value from SMF.	
authorizedQoSInformation	AuthorizedDefaultQos	O_C	0..1	This field holds the authorized QoS applied to PDU session.	
subscribedQoSInformation	SubscribedDefaultQos	O_C	0..1	This field holds the subscribed Default QoS	
authorizedSessionAMBR	Ambr	O_C	0..1	This field holds the authorized session-AMBR.	
subscribedSessionAMBR	Ambr	O_C	0..1	This field holds the subscribed session-AMBR.	
mAPDUSessionInformation	MAPDUSessionInformation	O_C	0..1	This field holds the MA PDU session information.	ATSSS

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 UTC time indicating time stamp for the first IP packet to be transmitted and mapped to the reporting used unit.	
timeofLastUsage	DateTime	O_C	0..1	the UTC time indicating time stamp for the last IP packet to be transmitted and mapped to the reporting used unit.	
qoSInformation	QoSData	O_C	0..1	the QoS applied for the reporting used unit. In case gbrUl or gbrDl are present for GBR flow, the GBR targets are "GUARANTEED", otherwise, are " NOT_GUARANTEED".	
qoSCharacteristics	QosCharacteristics	O_C	0..1	Map of QoS characteristics for non standard 5QIs and non-preconfigured 5QIs.	
afChargingIdentifier	ChargingId	O_C	0..1	An identifier, provided from the AF, may be used to correlate the measurement for the Charging key/Service identifier values in this PCC rule with application level reports.	
afChargingIdString	ApplicationChargingId	O_C	0..1	Used instead of afChargingIdentifier when feature is active.	AF_Charging_Identifier
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(ServingNetworkFunctionID)	O_C	0..N	the list of serving node identifiers during the used unit container interval.	
presenceReportingAreaInformation	map(PresenceInfo)	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.	
mAPDUSteeringFunctionality	SteeringFunctionality	O_C	0..1	Steering functionality .	ATSSS
mAPDUSteeringMode	SteeringMode	O_C	0..1	Steering Mode	ATSSS

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 withPrefix	Ipv6Addr	O_C	0..1	the IPv6 address with prefix of the served SUPI allocated for the PDU session	
pduAddressprefix length	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 address is dynamically allocated. This field is missing if address is static.	
iPv6dynamicPrefixFlag	boolean	O_C	0..1	This field indicates whether served IPv6 address prefix 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
servingNetworkFunctionInformation	NFIdentification	M	1	Serving Network Function information: i.e. AMF, I-SMF, SGW, V-SMF, or ePDG. For V-SMF, the NFIdentification.nodeFunctionality shall have the value SMF.	
aMFId	AmfId	O_C	0..1	AMF identifier	

6.1.6.2.2.13 Type RoamingQBCInformation

Table 6.1.6.2.1.13-1: 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 6.1.6.2.1.14-1: 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 UTC time indicating 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.	
downlinkVolume	Uint64	O_C	0..1	This field holds the amount of volume in downlink direction.	
localSequenceNumber	integer	M	1	QFI data container sequence number. It starts from 1 and increased by 1 for each container generation	
qFIContainerInformation	QFIContainerInformation	O_C	0..1	This field holds the QFI data container information	

6.1.6.2.2.15 Type RoamingChargingProfile

Table 6.1.6.2.1.15-1: Definition of type RoamingChargingProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
triggers	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 6.1.6.2.1.16-1: Definition of type QFIContainerInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
qFI	Qfi	O_M	0..1	QoS Flow Identifier (QFI)	
reportTime	DateTime	M	1	the UTC time indicating time stamp when the QFI data container was closed	
timeofFirstUsage	DateTime	O_C	0..1	the UTC time indicating time stamp for the first IP packet to be transmitted and mapped to the QFI container	
timeofLastUsage	DateTime	O_C	0..1	the UTC time indicating time stamp for the last IP packet to be transmitted and mapped to the QFI container.	
qoSInformation	QoSData	O_C	0..1	the QoS applied to QFI container. In case gbrUl or gbrDl are present for GBR QoS flow, the GBR targets are "GUARANTEED", otherwise, are " NOT_GUARANTEED".	
qoSCharacteristics	QosCharacteristics	O_C	0..1	Map of QoS characteristics for non standard 5QIs and non-preconfigured 5Qis.	
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(PresenceInfo)	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(ServingNetworkFunctionI)	O_C	0..N	the list of serving Node Identifiers during the used unit container interval.	
3gppPSDataOffStatus	3GPPPSDataOffStatus	O_C	0..1	the 3GPP Data off Status during the used unit container interval.	
3gppChargingId	ChargingId	O_C	0..1	IP-CAN bearer Charging identifier used to identify this IP-CAN bearer in different records created by PGW-C+SMF. Charging Id is generated by P-GW at IP-CAN bearer activation and is included in all containers in order to identify the containers which pertain to the IP-CAN bearer. Only applicable for 5GS and EPS interworking.	5GIEPC_CH
diagnostics	Diagnostics	O_C	0..1	provides a more detailed cause value for the release. Only applicable for 5GS and EPS interworking.	5GIEPC_CH
enhancedDiagnostics	array(string)	O_C	0..N	provides a set of causes for the release Only applicable for 5GS and EPS interworking.	5GIEPC_CH

Editor's Note: the diagnostics for interworking is ffs.

6.1.6.2.2.17 Type RANSecondaryRATUsageReport

Table 6.1.6.2.2.17-1: Definition of type RANSecondaryRATUsageReport

Attribute name	Data type	P	Cardinality	Description	Applicability
rANSecondaryRATType	RatType	O_M	0..1	RAT type associated to the reported usage on secondary RAT. The following values are applicable: - "NR" - "EUTRA"	
qosFlowsUsageReports	Array(QosFlowsUsageReport)	O_M	0..N	list of containers per QFI with volumes reported.	

6.1.6.2.2.18 Type QosFlowsUsageReport

Table 6.1.6.2.2.18-1: Definition of type QosFlowsUsageReport

Attribute name	Data type	P	Cardinality	Description	Applicability
qFI	Qfi	O_M	0..1	QoS Flow Identifier (QFI)	
startTimestamp	DateTime	O_C	0..1	Start time of the reported usage	
endTimestamp	DateTime	O_C	0..1	End time of the reported usage	
downlinkVolume	Uint64	O_C	0..1	Amount of volume in downlink direction.	
uplinkVolume	Uint64	O_C	0..1	Amount of volume in uplink direction.	

6.1.6.2.2.19 Type MAPDUSessionInformation

Table 6.1.6.2.2.19-1: Definition of MAPDUSessionInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
mAPDUSessionIndicator	MaPduIndication	O_C	0..1	MA PDU session indication, i.e., MA PDU Request or MA PDU Network-Upgrade Allowed.	ATSSS
aTSSSCapability	AtsssCapability	O_C	0..1	ATSSS capability	ATSSS

6.1.6.2.3 SMS Specified Data Type

6.1.6.2.3.1 Type ChargingDataRequest

This clause is additional attributes of the type ChargingDataRequest defined in clause 6.1.6.2.3.1 for SMS charging described in 3GPP TS 32.274[28].

Table 6.1.6.2.3.1-1: SMS Specified attribute of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
sMSChargingInformation	SMSChargingInformation	O_M	0..1	This field holds the SMSspecific information.	

6.1.6.2.3.2 Type SMSChargingInformation

Table 6.1.6.2.2.3-2: Definition of type SMSChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
originatorInfo	OriginatorInfo	O_M	0..1	originator of the SM	
recipientInfo	Array(RecipientInfo)	O_C	0..N	recipient information for the SM	
userEquipment Info	Pei	O_C	0..1	the identification of the terminal	
userLocationInfo	UserLocation	O_C	0..1	provides information on the location	
uetimeZone	TimeZone	O_C	0..1	the UE Time Zone the UE is currently located	
rATType	RatType	O_C	0..1	The identification of the RAT type.	
sMSCAddress	string	O_M	0..1	the address (e.g. E.164) of the SMS-service centre sending the Charging Data Request used for producing the record. (SMSC Address)	
sMDataCodingScheme	integer	O_M	0..1	the data coding scheme used within the SM. The information to populate this field is obtained from TP-DCS header.	
sMMessageType	SMmessageType	O_M	0..1	identifies the message that triggered the generation of charging information.	
sMReplyPathRequested	ReplyPathRequested	O_C	0..1	an indication of whether a reply SM to an original SM was requested to follow the same path as identified by the TP-Reply-Path (TP-RP) flag.	
sMUserDataHeader	string	O_C	0..1	carries the user data header extracted from the user data of the SM. The user data header (TP-UDH) is specified in TS 23.040 [x].	
sMStatus	string	O_C	0..1	the information from the TP-Status field in a Status-Report TPDU	
sMDischargeTime	DateTime	O_C	0..1	the time associated with the event being reported in the SM Status field. This information is only applicable to delivery report charging procedures.	
numberofMessagesSent	Uint32	O_C	0..1	the number of SMSs sent by the IMS application or the total number of short messages when this SM is part of concatenated short message, if applicable.	
sMServiceType	SMServiceType	O_C	0..1	the type of SM service that caused the charging interaction. It is only applicable for SM supplementary service procedures.	
sMSequenceNumber	Uint32	O_C	0..1	the sequence number of this SM within the concatenated short message	
sMSresult	Uint32	C	0..1	the result of the attempted SM transaction, if unsuccessful. This field is only for offline charging.	
submissionTime	DateTime	O_C	0..1	the timestamp of when the submitted SM arrived at the originating SMS Node	

sMpriority	SMPriority	O_C	0..1	any priority information associated with an SM	
messageReference	string	O_M	0..1	the identity used to identify an SM in the SMS node associated with entity that submitted it	
messageSize	Uint32	O_M	0..1	the total number of short messages when this SM is part of concatenated short message	
messageClass	MessageClass	O_M	0..1	implementation dependent the value selected for a specific transaction.	
deliveryReportRequested	DeliveryReportRequested	O_C	0..1	indicates whether a delivery report is requested by the SM originator	

6.1.6.2.3.3 Type OriginatorInfo

Table 6.1.6.2.3.3-1: Definition of type OriginatorInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
originatorSUPI	supi	O_M	0..1	SUPI of the originator of the SMS	
originatorGPSI	gpsi	O_C	0..1	GPSI of the originator of the SMS	
originatorOtherAddress	SMAddressInfo	O_M	0..1	the address of the recipient of the SM, when different from SUPI and GPSI	
originatorReceivedAddress	SMAddressInfo	O_C	0..1	original, unmodified address of the originator of the SM, as received by the SMS node, in case address manipulation (such as number plan corrections) have been applied in the SMS node.	
originatorSCCPAddress	string	O_C	0..1	SCCP calling address used to receive the SM at the SMS node	
sMOriginatorInterface	Interface	O_M	0..1	Provide the information describing the interface on which the SM was received by the SMS node.	
sMOriginatorProtocolId	string	O_C	0..1	the protocol used for the SM by originator	

6.1.6.2.3.4 Type RecipientInfo

Table 6.1.6.2.3.4-1: Definition of type RecipientInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
recipientSUPI	supi	O_M	0..1	SUPI of the recipient of the SM, as received by the SMS Node	
recipientGPSI	gpsi	O_C	0..1	GPSI of the recipient of the SM, as received by the SMS Node	
recipientOtherAddress	Array(recipientAddress)	O_C	0..N	the address of the recipient of the SM, as received by the SMS Node, when different from SUPI and GPSI	
recipientReceivedAddress	Array(SMAddressInfo)	O_C	0..N	original, unmodified address of the recipient of the SM, as received by the SMS node, in case address manipulation (such as number plan corrections) have been applied in the SMS node.	
recipientSCCPAddress	string	O_C	0..1	SCCP called address used by the SMS node to onward deliver the SM	
sMDestinationInterface	SMInterface	O_M	0..1	containing information describing the interface on which the SM was requested to be delivered	
sMRecipientProtocolId	string	O_C	0..1	holds the TP-PROTOCOL-ID (TP-PID)	

6.1.6.2.3.5 Type SMAddressInfo

Table 6.1.6.2.3.5-1: Definition of type SMAddressInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
sMaddressType	SMAddressType	O_C	0..1	the type of address carried	
sMaddressData	string	O_C	0..1	the address information and formatted according type of address	
sMaddressDomain	SMAddressDomain	O_C	0..1	the domain/network to which the associated address resides	

6.1.6.2.3.6 Type RecipientAddress

Table 6.1.6.2.3.6-1: Definition of type RecipientAddress

Attribute name	Data type	P	Cardinality	Description	Applicability
recipientAddressInfo	SMAddressInfo	O_C	0..1	indicates the type of address carried	
sMaddresseeType	SMAddresseeType	O_C	0..1	identifies the how the recipient is addressed in the header of an MM	

6.1.6.2.3.7 Type MessageClass

Table 6.1.6.2.3.7-1: Definition of type MessageClass

Attribute name	Data type	P	Cardinality	Description	Applicability
classIdentifier	ClassIdentifier	O_C	0..1	indicate the class identifier	
tokenText	string	O_C	0..1	contains extension information	

6.1.6.2.3.8 Type SMAddressDomain

Table 6.1.6.2.3.8-1: Definition of type SMAddressDomain

Attribute name	Data type	P	Cardinality	Description	Applicability
domainName	string	O_C	0..1	represents a fully qualified domain name (FQDN).	
3GPPIMSIMCCMNC	string	O_C	0..1	MCC and MNC extracted from the user's IMSI (first 5 or 6 digits, as applicable from the presented IMSI.	

6.1.6.2.3.9 Type SMInterface

Table 6.1.6.2.3.9-1: Definition of type SMInterface

Attribute name	Data type	P	Cardinality	Description	Applicability
interfaceId	string	O_C	0..1	the interface identification provided by the messaging node (originator/destination).	
interfaceText	string	O_C	0..1	It is the consolidation information about the application associated with the charging event	
interfacePort	string	O_C	0..1	the port-identification or contains information about the transport layer port used by the application associated with the charging event	
interfaceType	InterfaceType	O_C	0..1	type of interface / nature of the transaction in the messaging node for which the charging event occurs	

6.1.6.2.4 5G connection and mobility Specified Data Type

6.1.6.2.4.1 Type ChargingDataRequest

This clause specifies additional attributes of the type ChargingDataRequest defined in clause 6.1.6.2.1.1 for 5G connection and mobility described in 3GPP TS 32.256 [31].

Table 6.1.6.2.4.1-1: 5G connection and mobility Specified attribute of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
registrationChargingInformation	RegistrationChargingInformation	O_M	0..1	This field holds the 5G registration specific information.	
n2ConnectionChargingInformation	N2ConnectionChargingInformation	O_M	0..1	This field holds the 5G N2 connection specific information.	
locationReportingChargingInformation	LocationReportingChargingInformation	O_M	0..1	This field holds the 5G Location reporting specific information.	

6.1.6.2.4.2 Type ChargingDataResponse

This clause specifies additional attributes of the type ChargingDataResponse defined in clause 6.1.6.2.1.2 for 5G connection and mobility described in 3GPP TS 32.256 [31].

Table 6.1.6.2.4.2-1: 5G connection and mobility Specified attribute of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability

6.1.6.2.4.3 Type RegistrationChargingInformation

Table 6.1.6.2.4.3-1: Definition of type RegistrationChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
registrationMessagetype	RegistrationMessageType	M	1	Message type received by the AMF: registration (initial, initial, mobility, periodic, emergency), deregistration.	
userInformation	UserInformation	O_M	0..1	Includes information of user and user equipment	
userLocationinfo	UserLocation	O_C	0..1	Information on the location and location time	
uetimeZone	TimeZone	O_C	0..1	UE Timezone the UE is currently located	
rATType	RatType	O_C	0..1	RAT Type of the registration	
5gMMCapability	Bytes	O_C	0..1	5GMM capability IE as specified in clause 9.11.3.1 of 3GPP TS 24.501 [303]	
mICOModeIndication	MICOModeIndication	O_C	0..1	Indicates whether the requested use of MICO mode is accepted or not by the network	
smsIndication	SmsIndication	O_C	0..1	Indicates whether the SMS delivery over NAS is supported	
taiList	array(Tai)	O_C	0..N	An array of TAIs representing the set of tracking areas composing the Registration Area.	
serviceAreaRestriction	ServiceAreaRestriction	O_C	0..1	Service Area Restriction for the UE.	
requestedNSSAI	array(Snssai)	O_C	0..N	Requested NSSAI.	
allowedNssai	array(Snssai)	O_C	0..N	Allowed NSSAI.	
rejectedNSSAI	array(Snssai)	O_C	0..N	Rejected NSSAI.	

6.1.6.2.4.4 Type N2ConnectionChargingInformation

Table 6.1.6.2.4.4-1: Definition of type N2ConnectionChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
n2ConnectionMessageType	N2ConnectionMessageType	M	1	N2 message type received by the AMF specified in clause 9.7 3GPP TS 24.501 [303]	
userInformation	UserInformation	O_M	0..1	Includes information of user and user equipment	
userLocationinfo	UserLocation	O_C	0..1	Information on the location and location time	
uetimeZone	TimeZone	O_C	0..1	UE Timezone the UE is currently located	
rATType	RatType	O_C	0..1	RAT Type of the registration	
amfUeNgapId	integer	O_M	0..1	UE association over the N2 interface within the AMF.	
ranUeNgapId	integer	O_M	0..1	RAN UE NGAP ID over N2 interface	
ranNodeId	GlobalRanNodeId	O_C	0..1	Identity of the RAN node.	
restrictedRatList	array(RatType)	O_C	0..N	List of RAT types that are restricted for the UE	
forbiddenAreaList	array(Area)	O_C	0..N	List of forbidden areas for the UE	
serviceAreaRestriction	ServiceAreaRestriction	O_C	0..1	Service Area Restriction for the UE.	
restrictedCnList	array(CoreNetworkType)	O_C	0..N	List of Core Network Types that are restricted for the UE	
allowedNssai	array(Snssai)	O_C	0..N	Allowed NSSAI.	
rrcEstCause	string	O_C	0..1	RRC Establishment Cause, if received from the 5G-AN, specified in TS 38.413 [304], clause 9.3.1.111. It carries the value in hexadecimal representation Pattern: '^[0-9a-fA-F]+$'	

6.1.6.2.4.5 Type LocationReportingChargingInformation

Table 6.1.6.2.4.5-1: Definition of type LocationReportingChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
locationReportingMessageType	LocationReportingMessageType	M	1	Includes Location reporting message type	
userInformation	UserInformation	O_M	0..1	Includes information of user and user equipment	
userLocationinfo	UserLocation	O_M	0..1	Information on the location and location time	
uetimeZone	TimeZone	O_C	0..1	UE Timezone the UE is currently located	
presenceReportingAreaInformation	map(PresenceInfo)	O_C	0..N	The Presence Reporting Area(s) and status of UE presence.	
rATType	RatType	O_C	0..1	RAT Type of the registration	

6.1.6.2.5 Exposure Function Northbound API Specified Data Type

6.1.6.2.5.1 Type ChargingDataRequest

This clause is additional attributes of the type ChargingDataRequest defined in clause 6.1.6.2.1.1 for Exposure Function Northbound API charging described in 3GPP TS 32.254[14].

Table 6.1.6.2.5.1-1: Exposure Function Northbound API Specified attribute of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
nEFCharging Information	NEFChargingInformation	O_M	0..1	This field holds the Exposure Function Northbound API specific information.	

6.1.6.2.5.1a Type ChargingDataResponse

This clause specifies additional attributes of the type ChargingDataResponse defined in clause 6.1.6.2.1.2 for Exposure Function Northbound API charging described in 3GPP TS 32.254[14].

Table 6.1.6.2.5.2-1: Exposure Function Northbound API Specified attribute of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability

6.1.6.2.5.2 Type NEFChargingInformation

Table 6.1.6.2.5.3-2: Definition of type NEFChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
groupIdentifier	GroupId	O_C	0..N	The Identifier identifying the served group associated to the SUPI or GPSI.	
aPIDirection	APIDirection	M	1	The direction to indicate if it is an API invocation from an AF or notification to an AF.	
aPITargetNetworkFunction	NfInstanceId	O_C	0..1	The identifier of the network function that either is the destination of the API invocation or triggers the notification.	
aPIResultCode	Uint32	O_C	0..1	The result of API Invocation.	
aPIName	string	M	1	The name of the API invoked.	
aPIReference	Uri	O_C	0..1	The reference to the definition of the format of the API invocation.	
aPIContent	string	O_C	0..1	The actual content of the API invocation, in the format described by the aPIReference.	

6.1.6.2.6 Network Slice Management (NSM) Specified Data Type

6.1.6.2.6.1 Type ChargingDataRequest

This clause specifies additional attributes of the type ChargingDataRequest defined in clause 6.1.6.2.1.1 for Network Slice Management (NSM) charging described in 3GPP TS 28.202 [71].

Table 6.1.6.2.6.1-1: Network Slice Management (NSM) charging specified attribute of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
tenantIdentifier	string	O_M	0..1	Identifier of the tenant	
mnSConsumerIdentifier	string	O_M	0..1	MnS consumer Identifier	
nSMChargingInformation	NSMChargingInformation	O_M	0..1	This field holds the Network Slice Management (NSM) specific information.	

6.1.6.2.6.2 Type ChargingDataResponse

This clause specifies additional attributes of the type ChargingDataResponse defined in clause 6.1.6.2.1.2 Network Slice Management (NSM) charging described in 3GPP TS 28.202 [71].

Table 6.1.6.2.X.2-1: Network Slice Management (NSM) charging specified attribute of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability

6.1.6.2.6.3 Type NSMChargingInformation

Table 6.1.6.2.6.3-1: Definition of type NSMChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
managementOperation	ManagementOperation	M	1	Management operation associated to the provisioning specified in TS 28.532 [253].	
idNetworkSliceInstance	string	O_M	0..1	Managed Object Instance (MOI) of NetworkSlice IOC.This is a full DN according to 3GPP TS 32.300 [255].	
listOfServiceProfileChargingInformation	Array (ServiceProfileChargingInformation)	O_M	0..N	List of Service profile charging information	
managementOperationStatus	ManagementOperationStatus	O_C	0..1	Status of the management operation	
operationalState	OperationalState	O_C	0..1	Operational state of the network slice instance	
administrativeState	AdministrativeState	O_C	0..1	Administrative state of the network slice instance	

6.1.6.2.6.4 Type ServiceProfileChargingInformation

Table 6.1.6.2.6.4-1: Definition of type ServiceProfileChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
serviceProfileIdentifier	string	O_M	0..1	Described in TS 28.541 [254] clause 6.4 serviceProfileId attribute	
sNSSAIList	array(Snssai)	O_M	0..N	List of S-NSSAI(s)	
sST	Sst	O_M	0..1	Described in TS 28.541 [254] clause 6.4 sST attribute	
latency	integer	O_C	0..1	Described in TS 28.541 [254] clause 6.4 latency attribute	
availability	number	O_C	0..1	Described in TS 28.541 [254] clause 6.4 availability attribute	
resourceSharingLevel	SharingLevel	O_C	0..1	Described in TS 28.541 [254] clause 6.4 serviceProfile.resourceSharingLevel attribute	
jitter	integer	O_C	0..1	Described in TS 28.541 [254] clause 6.4 jitter attribute	
reliability	string	O_C	0..1	Described in TS 28.541 [254] clause 6.4 d reliability attribute	
maxNumberofUEs	integer	O_C	0..1	Described in TS 28.541 [254] clause 6.4 maxNumberofUEs attribute	
coverageArea	String	O_C	0..1	Described in TS 28.541 [254] clause 6.4 coverageArea attribute	
uEMobilityLevel	MobilityLevel	O_C	0..1	Described in TS 28.541 [254] clause 6.4 uEMobilityLevel attribute	
delayToleranceIndicator	Support	O_C	0..1	Described in TS 28.541 [254] clause 6.4 delayTolerance.support attribute	
dLThptPerSlice	Throughput	O_C	0..1	Described in TS 28.541 [254] clause 6.4 dLThptPerSlice attribute	
dLThptPerUE	Throughput	O_C	0..1	Described in TS 28.541 [254] clause 6.4 dLThptPerUE attribute	
uLThptPerSlice	Throughput	O_C	0..1	Described in TS 28.541 [254] clause 6.4 uLThptPerSlic attribute	
uLThptPerUE	Throughput	O_C	0..1	Described in TS 28.541 [254] clause 6.4 uLThptPerUE attribute	
maxNumberofPDUsessions	integer	O_C	0..1	Described in TS 28.541 [254] clause 6.4 maxNumberofConns.nOofConn attribute	
kPIMonitoringList	string	O_C	0..1	Described in TS 28.541 [254] clause 6.4 kPIMonitoring.kPIList attribute	
supportedAccessTechnology	integer	O_C	0..1	Described in TS 28.541 [254] clause 6.4 SupportedAccessTech.accTechList attribute	
v2XCommunicationModeIndicator	Support	O_C	0..1	Described in TS 28.541 [254] clause 6.4 V2XCommMode.v2XMode attribute	
addServiceProfileChargingInfo	string	O_C	0..1	This field contains additional attributes of the service profile.	

6.1.6.2.6.5 Type Throughput

Table 6.1.6.2.6.5-1: Definition of type Throughput

Attribute name	Data type	P	Cardinality	Description	Applicability
guaranteedThpt	Float	O_C	0..1	Described in TS 28.541 [254] clause 6.4 guaThpt attribute	
maximumThpt	Float	O_C	0..1	Described in TS 28.541 [254] clause 6.4 maxThpt attribute	

6.1.6.2.7 NS performance and analytics Specified Data Type

6.1.6.2.7.1 Type ChargingDataRequest

This clause is additional attributes of the type ChargingDataRequest defined in clause 6.1.6.2.7.1 for NS performance and analytics charging described in 3GPP TS 28.201[201].

Table 6.1.6.2.7.1-1: NS performance and analytics Specified attribute of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
tenantIdentifier	string	O_M	0..1	This field contains the identification of the subscriber of the network slice	
nSPAChargingInformation	NSPAChargingInformation	O_C	0..1	This field holds the network slice information, which is reported to the CHF	

6.1.6.2.7.2 Type ChargingDataResponse

This clause is additional attributes of the type ChargingDataResponse defined in clause 6.1.6.2.7.2 for NS performance and analytics charging described in 3GPP TS 28.201[201].

Table 6.1.6.2.7.2-1: NS performance and analytics Specified attribute of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability

6.1.6.2.7.3 Type UsedUnitContainer

This clause is additional portion of the type UsedUnitContainer defined in clause 6.1.6.2.1.10 for NS performance and analytics charging described in 3GPP TS 28.201[201].

Table 6.1.6.2.X.3-1: NS performance and analytics charging of type UsedUnitContainer

Attribute name	Data type	P	Cardinality	Description	Applicability
nSPAContainerInformation	NSPAContainerInformation	O_C	0..1	the network slice performance and analytics container specific information.	

6.1.6.2.7.4 Type NSPAChargingInformation

Table 6.1.6.2.7.4-1: Definition of type NSPAChargingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
singleNSSAI	Snssai	M	0..1	This field holds single Network Slice Selection Assistance Information for performance reporting.	

6.1.6.2.7.5 Type NSPAContainerInformation

Table 6.1.6.2.7.5-1: Definition of type NSPAContainerInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
latency	integer	O_C	0..1	This field holds latency	
throughput	Throughput	O_C	0..1	This field holds throughput.	
maximumPacketLossRate	string	O_C	0..1	This field holds maximum packet loss rate.	
serviceExperienceStatisticsData	ServiceExperienceInfo	O_C	0..1	This field holds service experience statistics data.	
theNumberOfPDUSessions	integer	O_C	0..1	This field holds the number of PDU sessions.	
theNumberOfRegisteredSubscribers	integer	O_C	0..1	This field holds the number of registered subscribers.	
loadLevel	NsiLoadLevelInfo	O_C	0..1	This field holds the load level of network slice.	

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
Diagnostics	integer	A more detailed cause value from SMF	
IPFilterRule	string	Filter rules corresponding to services	
N2ConnectionMessageType	integer	N2 message type received by the AMF	
LocationReportingMessageType	integer	Location reporting message type	

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 is a SMF.	
AMF	This field identifies that NF is a AMF.	
SMSF	This field identifies that NF service consumer is a SMSF.	
SGW	This field identifies that node is an SGW, only applicable for interworking with EPC.	
I_SMF	This field identifies that node is an I-SMF, only applicable for PDU session served by SMF + I-SMF.	
ePDG	This field identifies that node is an ePDG, only applicable for interworking with EPC/ePDG.	5GIEPC_CH
CEF	This field identifies that NF is a CEF.	

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	
UNIT_COUNT_INACTIVITY_TIMER	the unit count inactivity timer has expired	
ABNORMAL_RELEASE	PDU session has abnormal released.	
QOS_CHANGE	In request message, this value is used to indicate that QoS change has happened. Any of elements of QoSData may result in QoS change. In response message, this value is used to indicate that a change of authorized 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 radio access technology shall cause the service consumer to ask for a re-authorization of the associated quota	
SESSION_AMBR_CHANGE	In request message, this value is used to indicate that Session AMBR has been changed. In response message, this value is used to indicate that a change in the session AMBR shall cause the service consumer to ask for a re-authorization of the associated quota.	
GBR_GUARANTEED_STATUS_CHANGE	this value is used to indicate that GBR targets for the indicated SDFs are changed ("NOT_GUARANTEED" or "GUARANTEED" again).	
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 time zone 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 intervention	

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 Consumer	
REMOVAL_OF_UPF	A used UPF is removed	
ADDITION_OF_UPF	A new UPF is added.	
INSERTION_OF_ISMF	A new I-SMF is inserted	
REMOVAL_OF_ISMF	A used I-SMF is removed	
CHANGE_OF_ISMF	A used I-SMF is removed, and a new I-SMF is inserted	
START_OF_SERVICE_DATA_FLOW	A Service Data Flow has started	
HANDOVER_CANCEL	The handover is canceled.	
HANDOVER_START	The handover is start.	
HANDOVER_COMPLETE	The handover is completed.	
ECGI_CHANGE	In request message, this value is used to indicate that ECGI 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	5GIEPC_CH
TAI_CHANGE	In request message, this value is used to indicate that TAI 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	5GIEPC_CH
ADDITION_OF_ACCESS	Addition of access to the MA PDU session	ATSSS
REMOVAL_OF_ACCESS	Removal of access to the MA PDU session	ATSSS
START_OF_SDF_ADDITIONAL_ACCESS	Start of service data flow on additional access in a MA PDU session	ATSSS

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 NF Consumer triggers a Charging Event towards the CHF.	
DEFERRED_REPORT	chargeable events for which, when occurring, the charging data generated by the NF Consumer, 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	
QUOTA_MANAGEMENT_SUSPENDED	quota management control suspended	CHFCQM

6.1.6.3.11 Enumeration: FailureHandling

Table 6.1.6.3.11-1: Enumeration FailureHandling

Enumeration value	Description	Applicability
TERMINATE	the service shall only be granted for as long as there is a connection between NF consumer and the CHF.	
CONTINUE	the NF consumer should re-send and continue the request to an alternative server in the case of transport temporary failures, provided that a failover procedure is supported in the CHF and the NF consumer, and that an alternative server is available. Otherwise, the service SHOULD be granted, even if charging data request can't be delivered.	
RETRY_AND_TERMINATE	the NF consumer should re-send the request to an alternative server in the case of transport temporary failures, provided that a failover procedure is supported in the CHF and NF consumer, and that an alternative server is available. Otherwise, the service should not be granted when the charging data request 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 behaviour 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
SUCCESS	The CHF grants the service to the end-user. This applies to the rating group.	
END_USER_SERVICE_DENIED	The CHF denies the service request due to end-user service restrictions or limitations related to the end-user. If the request contained used units they shall be deducted, if applicable. This applies to the rating group.	
QUOTA_MANAGEMENT_NOT_APPLICABLE	The CHF determines that the service can be granted to the end user without quota management control, and used units shall be reported. This applies to the rating group.	
QUOTA_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 shall be deducted, if applicable. This applies to the rating group.	
END_USER_SERVICE_REJECTED	The CHF denies the service request in order to terminate the service for which credit is requested. This applies to the rating group.	
RATING_FAILED	The CHF determines that the service cannot be rated due to insufficient rating input, incorrect parameter combination or unrecognized parameter, or parameter value. This applies to the rating group.	
QUOTA_MANAGEMENT _SUSPENDED	The CHF determines that the quota management control can temporarily be suspended. This applies to the rating group.	CHFCQM

6.1.6.3.15 Enumeration: PartialRecordMethod

Table 6.1.6.3.15-1: Enumeration PartialRecordMethod

Enumeration value	Description	Applicability
DEFAULT	Default method used for partial records	
INDIVIDUAL	Individual methods 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	Applicability
IN_BOUND	In-bound roamer.	
OUT_BOUND	Out-bound roamer.	

6.1.6.3.17 Void

6.1.6.3.18 Enumeration: SMMessageType

Table 6.1.6.3.18-1: Enumeration SMMessageType

Enumeration value	Description	Applicability
SUBMISSION	The SMS message type is submission.	
DELIVERY_REPORT	The SMS message type is delivery report.	
SM_SERVICE_REQUEST	The SMS message type is SMS service request.	

6.1.6.3.19 Enumeration: SMPriority

Table 6.1.6.3.19-1: Enumeration SMPriority

Enumeration value	Description	Applicability
LOW	low priority	
NORMAL	normal priority	
HIGH	high priority	

6.1.6.3.20 Enumeration: DeliveryReportRequested

Table 6.1.6.3.20-1: Enumeration DeliveryReportRequested

Enumeration value	Description	Applicability
YES	Delivey report is requested.	
NO	The delivery report is not requested.	

6.1.6.3.21 Enumeration: InterfaceType

Table 6.1.6.3.21-1: Enumeration InterfaceType

Enumeration value	Description	Applicability
UNKNOWN	Interface type is unknown,	
MOBILE_ORIGINATING	Interface type is mobile originated.	
MOBILE_TERMINATING	Interface type is mobile terminated.	
APPLICATION_ORIGINATING	Interface type is application originated.	
APPLICATION_TERMINATION	Interface type is application terminated.	

6.1.6.3.22 Enumeration: ClassIdentifier

Table 6.1.6.3.22-1: Enumeration ClassIdentifier

Enumeration value	Description	Applicability
PERSONAL	The class identifier is personal.	
ADVERTISEMENT	The class identifier is advertisement.	
INFORMATIONAL	The class identifier is informational.	
AUTO	The class identifier is auto.	

6.1.6.3.23 Enumeration: SMAddressType

Table 6.1.6.3.23-1: Enumeration SMAddressType

Enumeration value	Description	Applicability
EMAIL_ADDRESS	The carried address type is EMAIL.	
MSISDN	The carried address type is MSISDN.	
IPV4_ ADDRESS	The carried address type is IPv4.	
IPV6_ ADDRESS	The carried address type is IPv6.	
NUMERIC_SHORTCODE	The carried address type is numeric shortcode.	
ALPHANUMERIC_SHORTCODE	The carried address type is alphanumeric shortcode.	
OTHER	The carried address type is other.	
IMSI	The carried address type is IMSI	

6.1.6.3.24 Enumeration: SMAddresseeType

Table 6.1.6.3.24-1: Enumeration SMAddresseeType

Enumeration value	Description	Applicability
TO	The addressee type is TO.	
CC	The addressee type is CC.	
BCC	The addressee type is BCC.	

6.1.6.3.25 Enumeration: SMServiceType

Table 6.1.6.3.25-1: Enumeration SMServiceType

Enumeration value	Description	Applicability
VAS4SMS_SHORT_MESSAGE_CONTENT_PROCESSING	The type of SM service is VAS4SMS short message content processing.	
VAS4SMS_SHORT_MESSAGE_FORWARDING	The type of SM service is VAS4SMS short message forwarding.	
VAS4SMS_SHORT_MESSAGE_FORWARDING _MULTIPLE_SUBSCRIPTIONS	The type of SM service is VAS4SMS short message forwarding multiple subscriptions.	
VAS4SMS_SHORT_MESSAGE_FILTERING	The type of SM service is VAS4SMS short message filtering.	
VAS4SMS_SHORT_MESSAGE_RECEIPT	The type of SM service is VAS4SMS short message receipt.	
VAS4SMS_SHORT_MESSAGE_NETWORK_STORAGE	The type of SM service is VAS4SMS short message network storage.	
VAS4SMS_SHORT_MESSAGE_TO_MULTIPLE_DESTINATIONS	The type of SM service is VAS4SMS short message to multiple destinations.	
VAS4SMS_SHORT_MESSAGE_VIRTUAL_PRIVATE_NETWORK(VPN)	The type of SM service is VAS4SMS short message virtual private network.	
VAS4SMS_SHORT_MESSAGE_AUTO_REPLY	The type of SM service is VAS4SMS short message auto reply.	
VAS4SMS_SHORT_MESSAGE_PERSONAL_SIGNATURE	The type of SM service is VAS4SMS short message personal signature.	
VAS4SMS_SHORT_MESSAGE_DEFERRED_DELIVERY	The type of SM service is VAS4SMS short message deferred delivery.	

6.1.6.3.26 Enumeration: ReplyPathRequested

Table 6.1.6.3.26-1: Enumeration ReplyPathRequested

Enumeration value	Description	Applicability
NO_REPLY_PATH_SET	The reply SM to an original SM was requested to follow the same path.	
REPLY_PATH_SET	The reply SM to an original SM was not requested to follow the same path.	

6.1.6.3.27 Enumeration: DnnSelectionMode

Table 6.1.6.3.27-1: Enumeration DnnSelectionMode

Enumeration value	Description
"VERIFIED"	UE or network provided DNN, subscription verified
"UE_DNN_NOT_VERIFIED"	UE provided DNN, subscription not verified
"NW_DNN_NOT_VERIFIED"	Network provided DNN, subscription not verified

6.1.6.3.28 Enumeration: EventType

Table 6.1.6.3.28-1: Enumeration EventType

Enumeration value	Description	Applicability
IEC	This value is used to indicate immediate event charging.	
PEC	This value is used to indicate post event charging.	

6.1.6.3.29 Enumeration: MICOModeIndication

Table 6.1.6.3.29-1: Enumeration MICOModeIndication

Enumeration value	Description	Applicability
"MICO_MODE"	MICO Mode used	
"NO_MICO_MODE"	MICO Mode not used	

6.1.6.3.30 Enumeration: RegistrationMessageType

Table 6.1.6.3.30-1: Enumeration RegistrationMessageType

Enumeration value	Description	Applicability
"INITIAL"	Initial registration	
"MOBILITY"	Mobility registration update	
"PERIODIC"	Periodic registration update	
"EMERGENCY"	Emergency registration	
"DEREGISTRATION"	Deregistration	

6.1.6.3.31 Enumeration: SmsIndication

Table 6.1.6.3.31-1: Enumeration SmsIndication

Enumeration value	Description	Applicability
"SMS_SUPPORTED"	SMS over NAS is supported	
"SMS_NOT_SUPPORTED"	SMS over NAS is Not supported	

6.1.6.3.32 Enumeration: APIDirection

Table 6.1.6.3.32-1: Enumeration APIDirection

Enumeration value	Description	Applicability
INVOCATION	Indicates an API invocation from an AF.	
NOTIFICATION	Indicates a notification to an AF.	

6.1.6.3.33 Enumeration: ManagementOperation

Table 6.1.6.3.33-1: Enumeration ManagementOperation

Enumeration value	Description	Applicability
createMOI	createMOI management operation	
modifyMOIAttributes	modifyMOIAttributes management operation	
deleteMOI	deleteMOI management operation	

6.1.6.3.34 Enumeration: ManagementOperationStatus

Table 6.1.6.3.34-1: Enumeration ManagementOperationStatus

Enumeration value	Description	Applicability
OPERATION_SUCCEEDED	Management operation succeeded	
OPERATION_FAILED	Management operation failed	

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 Nchf_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)
RE_AUTHORIZATION_FAILED	400 Bad Request	The HTTP request is rejected because the set of information needed by the NF Consumer (CTF) to report the usage is incomplete or erroneous or not available.
CHARGING_NOT_APPLICABLE	403 Forbidden	The HTTP request is rejected by the CHF since it has been determined that the service can be allowed 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.
END_USER REQUEST_DENIED	403 Forbidden	The HTTP request denied by the CHF due to restrictions or limitations related to the end-user.
QUOTA_LIMIT_REACHED	403 Forbidden	The HTTP request denied by the CHF because the end user's account could not cover the requested service. If the request contained used units they are deducted, if applicable.
END_USER_REQUEST_REJECTED	403 Forbidden	The HTTP request rejected by the CHF due to end-user restrictions or limitations.

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
1	CHFCQM	CHF-controlled quota management i.e. support for temporary offline
2	AF_Charging_Identifier	Indicates the support of long character strings as charging identifiers.
3	5GIEPC_CH	5GS interworking with EPC
4	ATSSS	This feature indicates support of Access Traffic Steering, Switching, Splitting (ATSSS).

6.2 Nchf_ OfflineOnlyCharging Service API

6.2.1 Introduction

The APIs defined in this clause implement the service operation defined in clause 5.3.2.

The Nchf_OfflineOnlyCharging service shall use the Nchf_OfflineOnlyCharging API.

The request URI used in each HTTP request from the NF service consumer towards the CHF shall have the structure defined in clause 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_OfflineOnlyCharging".
- The {apiVersion} shall be "v1".
- The {apiSpecificResourceUriPart} shall be set as described in clause 6.2.3.

6.2.2 Usage of HTTP

See clause 6.1.2 in this document.

6.2.3 Resources

6.2.3.1 Overview

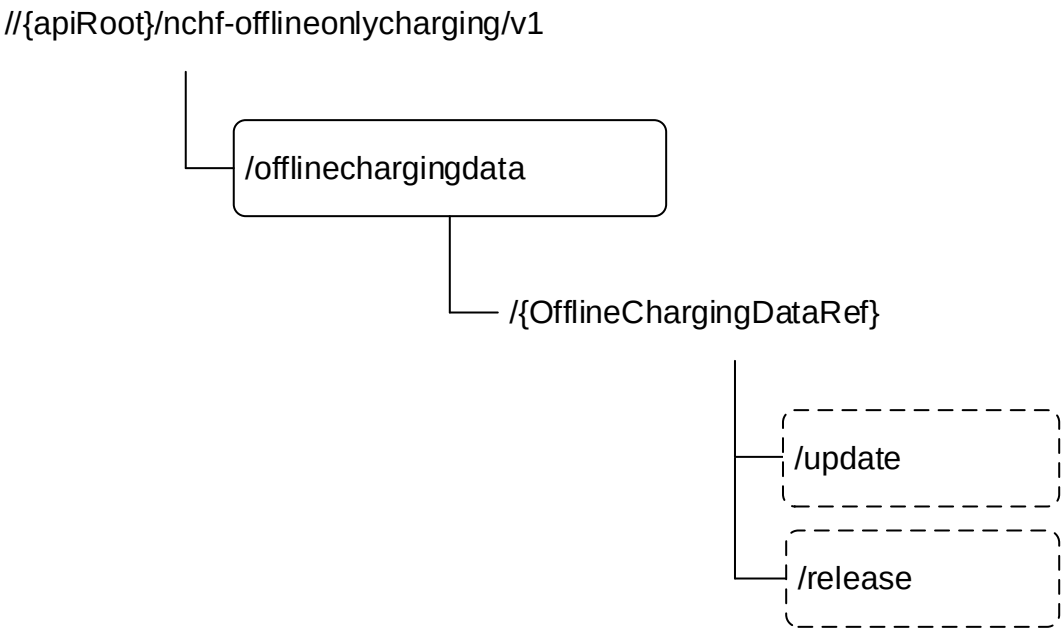

Figure 6.2.3.1-1: Resource URI structure of the Nchf_OfflineOnlyCharging API

Editor's note: Resource name in Figure 6.2.3.1-1 needs to be aligned with resource name in definition.

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

Table 6.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description	Corresponding service operation
Offline Only Charging Data	{apiRoot}/ nchf-offlineonlycharging/ v1/offlinechargingdata/	POST	Create a new Offline Only Charging Data resource	Nchf_OfflineOnlyCharging_Create
Individual Offline Only Charging Data	{apiRoot}/ nchf-offlineonlycharging/v1/ offlinechargingdata/{OfflineChargingDataRef }/update	update (POST)	Update an existing Offline Only Charging Data resource.	Nchf_OfflineOnlyCharging_Update
	{apiRoot}/ nchf_offlineonlycharging/v1/ offlinechargingdata /{OfflineChargingDataRef}/release	release (POST)	Update and release an existing Offline Only Charging Data resource.	Nchf_OfflineOnlyCharging_Release

6.2.3.2 Resource: Charging Data

6.2.3.2.1 Description

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

6.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nchf-offlineonlycharging/v1/offlinechargingdata**

This resource shall support the resource URI variables defined in table 6.2.3.2.2-1.

Table 6.2.3.2.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See clause 6.2.1

6.2.3.2.3 Resource Standard Methods

6.2.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.2.3.2.3.1-1.

Table 6.2.3.2.3.1-1: 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 6.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.3.2.3.1-3.

Table 6.2.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

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

Table 6.2.3.2.3.1-3: 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 an Offline Only Charging Data resource is confirmed and a representation of that resource is returned. The Offline Only 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)
ChargingDataResponse	M	1	400 Bad Request	(NOTE 2)
ChargingDataResponse	M	1	403 Forbidden	(NOTE 2)
ChargingDataResponse	M	1	404 Not Found	(NOTE 2)
	M	1	405 Method Not Allowed	(NOTE 2)
	M	1	408 Request Timeout	(NOTE 2)
	M	1	500 Internal Server Error	(NOTE 2)
	M	1	503 Service Unavailable	(NOTE 2)
	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 also apply. NOTE 2: Failure cases are described in clause 6.2.7.				

6.2.3.2.4 Resource Custom Operations

None.

6.2.3.3 Resource: Individual Offline Only Charging Data

6.2.3.3.1 Description

Individual Offline Only Charging Data resource represents an offline only charging data resource created in the CHF.

6.2.3.3.2 Resource Definition

Resource URI: **{apiRoot}/nchf-offlineonlycharging/v1/offlinechargingdata/{OfflineChargingDataRef}**

This resource shall support the resource URI variables defined in table 6.2.3.3.2-1.

Table 6.2.3.3.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See clause 6.2.1
OfflineChargingDataRef	Offline only charging data resource reference assigned by the CHF during the Nchf_ OfflineOnlyCharging_Create operation,

6.2.3.3.3 Resource Standard Methods

None.

6.2.3.3.4 Resource Custom Operations

6.2.3.3.4.1 Overview

Table 6.2.3.3.4.1-1: Custom operations

Custom operation URI	Mapped HTTP method	Description
{apiRoot}/ nchf-offlineonlyncharging/v1/ offlinechargingdata/{OfflineChargingDataRef }/update	POST	Update an existing Offline Only Charging Data resource.
{apiRoot}/ nchf-offlinecharging/v1/ offlinechargingdata /{OfflineChargingDataRef}/release	POST	Update and release an existing Offline Only Charging Data resource.

6.2.3.3.4.2 Operation: update

6.2.3.3.4.2.1 Description

This operation updates an existing Offline Only Charging Data resource.

6.2.3.3.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 6.2.3.3.4.2.2-1 and the response data structures and response codes specified in table 6.2.3.3.4.2.2-2.

Table 6.2.3.3.4.2.2-1: Data structures supported by the POST Request Body on this resource

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

Table 6.2.3.3.4.2.2-2: 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 an Offline Only Charging Data resource is confirmed and a representation of that resource is returned. The Offline Only Charging Data resource which is modified and returned successfully.
			307 Temporary Redirect	(NOTE 2)
ChargingDataResponse	M	1	400 Bad Request	(NOTE 2)
ChargingDataResponse	M	1	403 Forbidden	(NOTE 2)
ChargingDataResponse	M	1	404 Not Found	(NOTE 2)
	M	1	405 Method Not Allowed	(NOTE 2)
	M	1	408 Request Timeout	(NOTE 2)
	M	1	500 Internal Server Error	(NOTE 2)
	M	1	503 Service Unavailable	(NOTE 2)
	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 also apply. NOTE 2: Failure cases are described in clause 6.2.7.				

6.2.3.3.4.3 Operation: release

6.2.3.3.4.3.1 Description

This operation update and release an existing charging session

6.2.3.3.4.3.2 Operation Definition

This operation shall support the request data structures specified in table 6.2.3.3.4.3.2-1 and the response data structures and response codes specified in table 6.2.3.3.4.3.2-2.

Table 6.2.3.3.4.3.2-1: 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 Offline Only Charging Data resource matching the OfflineChargingDataRef according to the representation in the OfflineChargingData. The request URI is the representation in the Location header field in the 201 response of resource creation.

Table 6.2.3.3.4.3.2-2: 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 Offline Only Charging Data resource matching the OfflineChargingDataRef is modified and then released.
ChargingDataResponse	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] also apply. NOTE 2: Failure cases are described in clause 6.2.7.				

6.2.4 Custom Operations without associated resources

None.

6.2.5 Data Model

6.2.5.1 General

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

The Nchf_OfflineOnlyCharging Service API allows the NF consumer to consume the offline only charging service from the CHF as defined in 3GPP TS 32.290 [58].

Table 6.2.5.1-1 specifies the data types defined for the OfflineOlnyCharging service based interface protocol.

Table 6.2.5.1-1: Nchf_ OfflineOnlyCharging specific Data Types

Data type	Clause defined	Description	Applicability
ChargingDataRequest	6.2.5.2.1.1 6.2.5.2.2.1	Describes the attributes of Charging Data Request to CHF for initial, update and termination of the charging session.	
ChargingDataResponse	6.2.5.2.1.2 6.2.5.2.2.2	Describes the attributes of Charging Data Response from CHF on charging session initial, update and termination.	

The data types specified in Table 6.1.6.1-2 of this document are applied and re-used by the Nchf_OfflineOnlyCharging service based interface protocol.

6.2.5.2 Structured data types

6.2.5.2.1 Common Data Type

6.2.5.2.1.1 Type ChargingDataRequest

Table 6.2.5.2.1.1-1: Definition of type ChargingDataRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
subscriberIdentifier	SubscriberIdentifier	O_M	0..1	Identifier of the subscriber that uses the requested service.	
nfConsumerIdentification	NFConsumerIdentification	M	1	This is a grouped field which contains a set of information identifying the NF consumer of the charging service.	
invocationTimeStamp	DateTime	M	1	The time at which the request is send	
invocationSequenceNumber	Uint32	M	1	This field contains the sequence number of the charging service invocation by the NF consumer.	
service SpecificationInformation	String	O_C	0..1	Identifies service specific document that applies to the request, e.g. the service specific document ('middle tier' TS) and 3GPP release the service specific document is based upon.	
multipleUnitUsage	array(MultipleUnitUsage)	O_C	0..N	This field contains the parameters for usage reporting.	
triggers	array(Trigger)	O_C	0..N	This field identifies the event(s) triggering the request.	

6.2.5.2.1.2 Type ChargingDataResponse

Table 6.2.5.2.1.2-1: Definition of type ChargingDataResponse

Attribute name	Data type	P	Cardinality	Description	Applicability
invocationTimestamp	DateTime	M	1	This field holds the timestamp of the charging service response from the CHF.	
invocationResult	InvocationResult	O_C	1	This field holds the result code in case of unsuccessful charging service invocation by the NF consumer	
invocationSequenceNumber	Uint32	M	1	This field contains the sequence number of the charging service invocation by the NF consumer.	
sessionFailover	SessionFailover	O_C	0..1	This field indicates whether alternative CHF is supported for ongoing charging service failover handling by NF consumer.	
triggers	array(Trigger)	O_C	0..N	This field identifies the chargeable event(s) supplied by CHF to override/activate the existing chargeable event(s) in NF consumer. The presence of the triggers attribute without any triggerType is used by CHF to disable all the triggers.	

6.2.5.2.1.3 Type MultipleUnitUsage

Table 6.2.5.2.1.3-1: Definition of type MultipleUnitUsage

Attribute name	Data type	P	Cardinality	Description	Applicability
ratingGroup	RatingGroup	M	1	The identifier of a rating group.	
usedUnitContainer	array(UsedUnitContainer)	O_C	0..N	This field contains the amount of used non-monetary service units measured.	

6.2.5.2.1.4 Type UsedUnitContainer

Table 6.2.5.2.1.4-1: 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	
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 used service specific units.	
eventTimeStamps	Array(DateTime)	O_C	0..N	This field holds the timestamps of the event reported in the Service Specific Unit s, if the reported units are event 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.	

6.2.5.2.1.5 Type Trigger

Table 6.2.5.2.1.5-1: 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	
triggerCategory	TriggerCategory	M	1	This field indicates whether the charging data generated by the NF consumer for the trigger lead to a Charging Event towards the CHF immediately or not.	
timeLimit	DurationSec	O_C	0..1	Time limit if trigger type is "Expiry of data time limit"	
volumeLimit64	Uint64	O_C	0..1	Volume limit if trigger type is "Expiry of data volume limit".	
eventLimit	Uint32	O_C	0..1	Time limit if trigger type is "Expiry of data event limit"	
maxNumberOfccc	Uint32	O_C	0..1	Maximum number if trigger type is "Max nb of number of charging condition changes"	

6.2.5.2.2 5G Data Connectivity Specified Data Type

6.2.5.2.2.1 Type ChargingDataRequest

The additional attributes of the type ChargingDataRequest defined in clause 6.2.5.2.1.1 for 5G data connectivity charging see table 6.1.6.2.2.1-1.

6.2.5.2.2.2 Type ChargingDataResponse

The additional attributes of the type ChargingDataResponse defined in clause 6.2.5.2.1.2 for 5G data connectivity charging see table 6.1.6.2.2.2-1.

6.2.5.2.2.3 Type MultipleUnitUsage

The additional attributes of the type MultipleUnitUsage defined in clause 6.2.5.2.1.3 for 5G data connectivity charging see table 6.1.6.2.2.3-1.

6.2.5.2.2.4 Type UsedUnitContainer

The additional attributes of the type UsedUnitContainer defined in clause 6.2.5.2.1.4 for 5G data connectivity charging see table 6.1.6.2.2.5-1.

6.2.5.2.2.5 Type PDUSessionChargingInformation

The additional attributes of the Type PDUSessionChargingInformation for 5G data connectivity charging see table 6.1.6.2.2.6-1.

6.2.5.2.2.6 Type UserInformation

The additional attributes of the Type UserInformation for 5G data connectivity charging see table 6.1.6.2.2.7-1.

6.2.5.2.2.7 Type PDUSessionInformation

The additional attributes of the Type PDUSessionInformation for 5G data connectivity charging see table 6.1.6.2.2.8-1.

6.2.5.2.2.8 Type PDUContainerInformation

The additional attributes of the Type PDUContainerInformation for 5G data connectivity charging see table 6.1.6.2.2.9-1.

6.2.5.2.2.9 Type NetworkSlicingInfo

The additional attributes of the Type NetworkSlicingInfo for 5G data connectivity charging see table 6.1.6.2.2.10-1.

6.2.5.2.2.10 Type PDUAddress

The additional attributes of the Type PDUAddress for 5G data connectivity charging see table 6.1.6.2.2.11-1.

6.2.5.2.2.11 Type ServingNetworkFunctionID

The additional attributes of the Type ServingNetworkFunctionID for 5G data connectivity charging see table 6.1.6.2.2.12-1.

6.2.5.2.2.12 Type RoamingQBCInformation

The additional attributes of the Type RoamingQBCInformation for 5G data connectivity charging see table 6.1.6.2.2.13-1.

6.2.5.2.2.13 Type MultipleQFIcontainer

The additional attributes of the Type MultipleQFIcontainer for 5G data connectivity charging see table 6.1.6.2.2.14-1.

6.2.5.2.2.14 Type RoamingChargingProfile

The additional attributes of the Type RoamingChargingProfile for 5G data connectivity charging see table 6.1.6.2.2.15-1.

6.2.5.2.2.15 Type QFIContainerInformation

The additional attributes of the Type QFIContainerInformation for 5G data connectivity charging see table 6.1.6.2.2.16-1.

6.2.5.2.2.16 Type RANSecondaryRATUsageReport

The additional attributes of the Type RANSecondaryRATUsageReport for 5G data connectivity charging see table 6.1.6.2.2.17-1.

6.2.5.2.2.17 Type QosFlowsUsageReport

The additional attributes of the Type QosFlowsUsageReport for 5G data connectivity charging see table 6.1.6.2.2.18-1.

6.2.5.3 Simple data types and enumerations

6.2.5.3.1 Introduction

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

6.2.5.3.2 Simple data types

The simple data types are the same as definitions in table 6.1.6.3.2-1.

6.2.5.3.3 Enumeration: ChargingCharacteristicsSelectionMode

The Enumeration ChargingCharacteristicsSelectionMode is the same as definition in table 6.1.6.3.5-1.

6.2.5.3.4 Enumeration: NodeFunctionality

Table 6.2.5.3.4-1: Enumeration NodeFunctionality

Enumeration value	Description	Applicability
SMF	This field identifies that NF is a SMF.	
I_SMF	This field identifies that node is an I-SMF, only applicable for PDU session served by SMF + I-SMF.	

6.2.5.3.5 Enumeration: TriggerType

Table 6.2.5.3.5-1: Enumeration TriggerType

Enumeration value	Description	Applicability
FINAL	a service termination has happened	
ABNORMAL_RELEASE	PDU session has abnormal released.	
QOS_CHANGE	In request message, this value is used to indicate that QoS change has happened. Any of elements of QoSData may result in QoS change.	
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.	
RAT_CHANGE	In request message, this value is used to indicate that RAT type has been changed.	
SESSION_AMBR_CHANGE	In request message, this value is used to indicate that Session AMBR has been changed.	
UE_TIMEZONE_CHANGE	In request message, this value is used to indicate that UE timezone has been changed.	
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 intervention	
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.	
SERVING_NODE_CHANGE	A serving node (e.g., AMF) change in the NF Consumer	
REMOVAL_OF_UPF	A used UPF is removed	
ADDITION_OF_UPF	A new UPF is added.	
INSERTION_OF_ISMF	A new I-SMF is inserted	
REMOVAL_OF_ISMF	A used I-SMF is removed	
CHANGE_OF_ISMF	A used I-SMF is removed, and a new I-SMF is inserted	
HANDOVER_CANCEL	The handover is cancelled.	
HANDOVER_START	The handover is started.	
HANDOVER_COMPLETE	The handover is complete.	
ADDITION_OF_ACCESS	Addition of access to the MA PDU session	ATSSS
REMOVAL_OF_ACCESS	Removal of access to the MA PDU session	ATSSS
START_OF_SDF_ADDITIONAL_ACC ESS	Start of service data flow on additional access in a MA PDU session	ATSSS

6.2.5.3.6 Enumeration: ResultCode

Table 6.2.5.3.6-1: Enumeration ResultCode

Enumeration value	Description	Applicability
SUCCESS	The CHF opens or updates CDR.	

6.2.5.3.7 Enumeration: 3GPPPSDataOffStatus

The Enumeration ChargingCharacteristicsSelectionMode is the same as definition in table 6.1.6.3.13-1.

6.2.5.3.8 Enumeration: PartialRecordMethod

The Enumeration PartialRecordMethod is the same as definition in table 6.1.6.3.15-1.

6.2.5.3.9 Enumeration: RoamerInOut

The Enumeration PartialRecordMethod is the same as definition in table 6.1.6.3.16-1.

6.2.5.3.10 Enumeration: SubscriberIdentityType

The Enumeration PartialRecordMethod is the same as definition in table 6.1.6.3.17-1.

6.2.6 Error handling

6.2.6.1 General

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

For the Nchf_OfflineOnlyCharging API, HTTP error responses shall be supported as specified in clause 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 clauses shall apply.

6.2.6.2 Protocol Errors

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

6.2.6.3 Application errors

The application errors defined for the Nchf_OfflineOnlyCharging API are listed in table 6.2.6.3-1. 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 6.2.6.3-1. 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 Nchf_OfflineOnlyCharging 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, erroneous, or not available. (E.g. Rating Group, subscriber information)

6.2.7 Feature negotiation

The optional features in table 6.2.7-1 are defined for the Nchf_OfflineOnlyCharging API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [299].

Table 6.2.7-1: Supported Features

Feature number	Feature Name	Description
X	ATSSS	This feature indicates support of Access Traffic Steering, Switching, Splitting (ATSSS).

7 Bindings of CDR field, Information Element and Resource Attribute

7.0 General

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	Charging Session Identifier	/{ChargingDataRef }/ or /{OfflineChargingDataRef}/
		ChargingDataRequest
Subscriber Identifier	Subscriber Identifier	/subscriberIdentifier
Invocation Timestamp	-	/invocationTimeStamp
Invocation Sequence Number	-	/invocationSequenceNumber
Retransmission Indicator	-	/retransmissionIndicator
One-time Event	-	/oneTimeEvent
NF Consumer Identification	NF Information	/nfConsumerIdentification
NF Name	NF Name	/nfConsumerIdentification/nFName
NF Address	NF Address	/nfConsumerIdentification/nFIPv4Address /nfConsumerIdentification/nFIPv6Address /nfConsumerIdentification/nFFqdn
NF PLMN ID	NF PLMN ID	/nfConsumerIdentification/nFPLMNID
NF Functionality	NF Functionality	/nfConsumerIdentification/nodeFunctionality
Notify URI		/notifyUri
Service Specification Information	Service Specification Information	/serviceSpecificationInfo
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 Quota management Indicator Ext	/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	Triggers	/triggers
		ChargingDataResponse
Invocation Timestamp		/invocationTimeStamp
Invocation Sequence Number		/invocationSequenceNumber
Session Failover	-	/sessionFailover
Triggers	-	/triggers
Multiple Unit Information	-	/multipleUnitInformation
Result Code	-	/multipleUnitInformation
Rating Group	-	/multipleUnitInformation/ratingGroup
Granted Unit	-	/multipleUnitInformation/grantedUnit
Tariff Time Change	-	/multipleUnitInformation/grantedUnit/tariffTimeChange
Time	-	/multipleUnitInformation/grantedUnit/time
Total Volume	-	/multipleUnitInformation/grantedUnit/totalVolume

Uplink Volume	-	/multipleUnitInformation/grantedUnit/uplinkVolume
Downlink Volume	-	/multipleUnitInformation/grantedUnit/downlinkVolume
Service Specific Units	-	/multipleUnitInformation/grantedUnit/serviceSpecificUnits
Triggers	-	/multipleUnitInformation/triggers
Validity Time	-	/multipleUnitInformation/validityTime
Quota Holding Time	-	/multipleUnitInformation/quotaHoldingTime
Final Unit Indication	-	/multipleUnitInformation/finalUnitIndication
Time Quota Threshold	-	/multipleUnitInformation/timeQuotaThreshold
Volume Quota Threshold	-	/multipleUnitInformation/volumeQuotaThreshold
Unit Quota Threshold	-	/multipleUnitInformation/unitQuotaThreshold
Invocation Result	-	/invocationResult
Invocation Result code	-	/invocationResult/error/cause
Failed parameter	-	/invocationResult/error/invalidParams
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/pDUContainerInformation
Time of First Usage	Time of First Usage	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/timeofFirstUsage
Time of Last Usage	Time of Last Usage	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/timeofLastUsage
QoS Information	QoS Information	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/qoSInformation
QoS Characteristics	QoS Characteristics	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/qoSCharacteristics
AF Charging Identifier	AF Charging Identifier	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/afChargingIdentifier
AF Charging Id String	AF Charging Id String	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/afChargingIdString
User Location Information	User Location Information	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/userLocationInformation
UE Time Zone	UE Time Zone	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/uetimeZone
RAT Type	RAT Type	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/rATType
Serving Network Function ID	Serving Network Function ID	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/servingNodeID
Presence Reporting Area Information	Presence Reporting Area Information	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/ presenceReportingAreaInformation
3GPP PS Data Off Status	3GPP PS Data Off Status	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/3gppPSDataOffStatus
Sponsor Identity	Sponsor Identity	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/sponsorIdentity
Application Service Provider Identity	Application Service Provider Identity	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/applicationserviceProviderIdentity
Charging Rule Base Name	Charging Rule Base Name	/multipleUnitUsage/usedUnitContainer/pDUContainerInformation/chargingRuleBaseName
PDU Session Charging Information	PDU Session Charging Information	/pDUSessionChargingInformation
Charging Id	Charging Id	/pDUSessionChargingInformation/chargingId
Home Provided ChargingId	Home Provided ChargingId	/pDUSessionChargingInformation/ homeProvidedChargingId
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
UE Time Zone	UE Time Zone	/pDUSessionChargingInformation/uEtimeZone
Presence Reporting Area Information	Presence Reporting Area Information	/pDUSessionChargingInformation/ presenceReportingAreaInformation
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/pduSessionInformation/networkSlicingInfo

PDU Type	PDU Type	/pDUSessionChargingInformation /pduSessionInformation/pduType
PDU Address	PDU Address	/pDUSessionChargingInformation /pduSessionInformation/pduAddress
PDU IPv4 Address	PDU IPv4 Address	/pDUSessionChargingInformation/pduSessionInformation/pduAddress/pduIPv4Address
PDU IPv6 Address with prefix	PDU IPv6 Address with prefix	/pDUSessionChargingInformation/pduSessionInformation/pduAddress/pduIPv6Addresswithprefix
PDU Address prefix length	PDU Address prefix length	/pDUSessionChargingInformation /pduSessionInformation/pduAddress/pduAddressprefixlength
IPv4 Dynamic Address Flag	IPv4 Dynamic Address Flag	/pDUSessionChargingInformation /pduSessionInformation/pduAddress/ iPv4dynamicAddressFlag
IPv6Dynamic Address Flag	IPv6 Dynamic Address Flag	pDUSessionChargingInformation /pduSessionInformation/pduAddress/ iPv6dynamicAddressFlag
SSC Mode	SSC Mode	/pDUSessionChargingInformation /pduSessionInformation/sscMode
SUPI PLMN ID	SUPI PLMN ID	/pDUSessionChargingInformation /pduSessionInformation/hPlmnId
Serving Network Function ID	Serving Network Function ID	/pDUSessionChargingInformation /pduSessionInformation/ servingNetworkFunctionID
Serving CN PLMN ID	Serving CN PLMN ID	/pDUSessionChargingInformation/pduSessionInformation/servingCNPlmnId
RAT Type	RAT Type	/pDUSessionChargingInformation /pduSessionInformation/ratType
Data Network Name Identifier	Data Network Name Identifier	/pDUSessionChargingInformation /pduSessionInformation/dnnid
DNN Selection Mode	DNN Selection Mode	/pDUSessionChargingInformation /pduSessionInformation/dNNselectionMode
Authorized QoS information	Authorized Qos Information	/pDUSessionChargingInformation /pduSessionInformation/authorized qoSInformation
Subscribed QoS Information	Subscribed QoS Information	/pDUSessionChargingInformation /pduSessionInformation/subscribedQoSInformation
Authorized Session-AMBR	Authorized Session-AMBR	/pDUSessionChargingInformation /pduSessionInformation/authorizedSessionAMBR
Subscribed Session-AMBR	Subscribed Session-AMBR	/pDUSessionChargingInformation /pduSessionInformation/subscribedSessionAMBR
Charging Characteristics	Charging Characteristics	/pDUSessionChargingInformation /pduSessionInformation/ chargingCharacteristics
Charging Characteristics Selection Mode	Charging Characteristics Selection Mode	/pDUSessionChargingInformation /pduSessionInformation/chargingCharacteristicsSelectionMode
PDU session start Time	PDU session start Time	/pDUSessionChargingInformation /pduSessionInformation/startTime
PDU session stop Time	PDU session stop Time	/pDUSessionChargingInformation /pduSessionInformation/stopTime
Diagnostics	Diagnostics	/pDUSessionChargingInformation /pduSessionInformation/diagnostics
3GPP PS Data Off Status	3GPP PS Data Off Status	/pDUSessionChargingInformation /pduSessionInformation/3gppPSDataOffStatus
Session Stop Indicator	Session Stop Indicator	/pDUSessionChargingInformation /pduSessionInformation/sessionStopIndicator
Unit Count Inactivity Timer	-	/pDUSessionChargingInformation/unitCountInactivityTimer
RAN Secondary RAT Usage Report	RAN Secondary RAT Usage Report	/pDUSessionChargingInformation/rANSecondaryRATUsageReport

NG RAN Secondary RAT Type	NG RAN Secondary RAT Type	/pDUSessionChargingInformation/rANSecondaryRATUsageReport/rANSecondaryRATType
Qos Flows Usage Reports	Qos Flows Usage Reports	/pDUSessionChargingInformation/rANSecondaryRATUsageReport/qosFlowsUsageReports
Roaming QBC information	Roaming QBC information	/roamingQBCInformation
Multiple QFI container	Multiple QFI container	/roamingQBCInformation/multipleQFIcontainer
Triggers	Triggers	/roamingQBCInformation/multipleQFIcontainer/triggers
Trigger Timestamp	Trigger Timestamp	/roamingQBCInformation/multipleQFIcontainer/triggerTimestamp
Time	Time	/roamingQBCInformation/multipleQFIcontainer/time
Total Volume	Total Volume	/roamingQBCInformation/multipleQFIcontainer/totalVolume
Uplink Volume	Uplink Volume	/roamingQBCInformation/multipleQFIcontainer/uplinkVolume
Downlink Volume	Downlink Volume	/roamingQBCInformation/multipleQFIcontainer/downlinkVolume
Local Sequence Number	Local Sequence Number	/roamingQBCInformation/multipleQFIcontainer/localSequenceNumber
QFI Container information	QFI Container information	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation
QoS Flow Id	QoS Flow Id	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/qFI
Time of First Usage	Time of First Usage	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/ timeofFirstUsage
Time of Last Usage	Time of Last Usage	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/timeofLastUsage
QoS Information	QoS Information	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/qoSInformation
QoS Characteristics	QoS Characteristics	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/qoSCharacteristics
User Location Information	User Location Information	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/userLocationInformation
UE Time Zone	UE Time Zone	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/uetimeZone
Presence Reporting Area Information	Presence Reporting Area Information	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/presenceReportingAreaInformation
RAT Type	RAT Type	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/rATType
Report Time	Report Time	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/reportTime
Serving Network Function ID	Serving Network Function ID	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/servingNetworkFunctionID
3GPP PS Data Off Status	3GPP PS Data Off Status	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/3gppPSDataOffStatus
EPS bearer Charging Id	EPS bearer Charging Id	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/3gppChargingId
Diagnostics	Diagnostics	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/diagnostics
Enhanced Diagnostics	Enhanced Diagnostics	/roamingQBCInformation/multipleQFIcontainer/qFIContainerInformation/enhancedDiagnostics
UPF ID	UPF ID	/roamingQBCInformation/uPFID
Roaming Charging Profile	Roaming Charging Profile	/roamingQBCInformation/roamingChargingProfile
Trigger	Trigger	/roamingQBCInformationroamingChargingProfile/trigger
Partial record method	Partial record method	/roamingQBCInformation/roamingChargingProfile/partialRecordMethod
		ChargingDataResponse
Multiple Unit information	-	/multipleUnitInformation
UPF ID	-	/multipleUnitInformation/uPFID

7.3 Bindings for SMS charging

Table 7.3-1: Bindings of CDR field, Information Element and Resource Attribute for SMS charging

Information Element	CDR Field	Resource Attribute
		ChargingDataRequest
SMS Charging Information	SMS Charging Information	/sMSChargingInformation
Originator Info	Originator Info	/sMSChargingInformation/originatorInfo
Originator SUPI	Originator SUPI	/sMSChargingInformation/originatorInfo/originatorSUPI
Originator GPSI	Originator GPSI	/sMSChargingInformation/originatorInfo/originatorGPSI
Originator Other Address	Originator Other Address	/sMSChargingInformation/originatorInfo/originatorOtherAddress
Originator Received Address	Originator Received Address	/sMSChargingInformation/originatorInfo/originatorReceivedAddress
Originator SCCP Address	Originator SCCP Address	/sMSChargingInformation/originatorInfo/originatorSCCPAddress
SM Originator Interface	SM Originator Interface	/sMSChargingInformation/originatorInfo/sMOriginatorInterface
SM Originator Protocol Id	SM Originator Protocol Id	/sMSChargingInformation/originatorInfo/sMOriginatorProtocolId
Recipient Info	Recipient Info	/sMSChargingInformation/recipientInfo
Recipient SUPI	Recipient SUPI	/sMSChargingInformation/recipientInfo/recipientSUPI
Recipient GPSI	Recipient GPSI	/sMSChargingInformation/recipientInfo/recipientGPSI
Recipient Other Address	Recipient Other Address	/sMSChargingInformation/recipientInfo/recipientOtherAddress
Recipient Received Address	Recipient Received Address	/sMSChargingInformation/recipientInfo/recipientReceivedAddress
Recipient SCCP Address	Recipient SCCP Address	/sMSChargingInformation/recipientInfo/recipientSCCPAddress
SM Destination Interface	SM Destination Interface	/sMSChargingInformation/recipientInfo/sMDestinationInterface
SM Recipient Protocol Id	SM Recipient Protocol Id	/sMSChargingInformation/recipientInfo/sMrecipientProtocolId
User Equipment Info	User Equipment Info	/sMSChargingInformation/userEquipmentInfo
User Location Info	User Location Info	/sMSChargingInformation/userLocationinfo
UE Time Zone	UE Time Zone	/sMSChargingInformation/uetimeZone
RAT Type	RAT Type	/sMSChargingInformation/rATType
SMSC Address	SMSC Address	/sMSChargingInformation/sMSCAddress
SM Data Coding Scheme	SM Data Coding Scheme	/sMSChargingInformation/sMDataCodingScheme
SM Message Type	SM Message Type	/sMSChargingInformation/sMMessageType
SM Reply Path Requested	SM Reply Path Requested	/sMSChargingInformation/sMReplyPathRequested
SM User Data Header	SM User Data Header	/sMSChargingInformation/sMUserDataHeader
SM Status	SM Status	/sMSChargingInformation/sMStatus
SM Discharge Time	SM Discharge Time	/sMSChargingInformation/sMDischargeTime
Number of Messages Sent	Number of Messages Sent	/sMSChargingInformation/numberofMessagesSent
SM Service Type	SM Service Type	/sMSChargingInformation/sMServiceType
SM Sequence Number	SM Sequence Number	/sMSChargingInformation/sMSequenceNumber
SMS result	SMS result	/sMSChargingInformation/sMSresult
Submission Time	Submission Time	/sMSChargingInformation/submissionTime
SM Priority	SM Priority	/sMSChargingInformation/sMPriority
Message Reference	Message Reference	/sMSChargingInformation/messageReference
Message Size	Message Size	/sMSChargingInformation/messageSize
Message Class	Message Class	/sMSChargingInformation/messageClass
Delivery Report Requested	Delivery Report Requested	/sMSChargingInformation/deliveryReportRequested
		ChargingDataResponse
-	-	-

7.4 Bindings for 5G connection and mobility

Table 7.4-1: Bindings of 5G 5G connection and mobility CDR field, Information Element and Resource Attribute

Information Element	CDR Field	Resource Attribute
		ChargingDataRequest
Registration Charging Information	Registration Charging Information	/registrationChargingInformation
Registration message type	Registration message type	/registrationChargingInformation/registrationMessagetype
User Information	User Information	/registrationChargingInformation/userInformation
User Identifier	User Identifier	/registrationChargingInformation/userInformation/servedGPSI
User Equipment Info	User Equipment Info	/registrationChargingInformation/userInformation/servedPEI
unauthenticatedFlag	unauthenticatedFlag	/registrationChargingInformation/userInformation/unauthenticatedFlag
User Location Information	User Location Information	/registrationChargingInformation/userLocationinfo
UE Time Zone	UE Time Zone	/registrationChargingInformation/uetimeZone
RAT Type	RAT Type	/registrationChargingInformation/rATType
5GMM Capability	5GMM Capability	/registrationChargingInformation/5gMMCapability
MICO Mode Indication	MICO Mode Indication	/registrationChargingInformation/mICOModeIndication
SMS Supported Indication	SMS Supported Indication	/registrationChargingInformation/smsIndication
TAI List	TAI List	/registrationChargingInformation/taiList
Service Area Restrictions	Service Area Restrictions	/registrationChargingInformation/serviceAreaRestriction
Requested NSSAI	Requested NSSAI	/registrationChargingInformation/requestedNSSAI
Allowed NSSAI	Allowed NSSAI	/registrationChargingInformation/allowedNssai
Rejected NSSAI	Rejected NSSAI	/registrationChargingInformation/rejectedNSSAI
N2 Connection Charging Information	N2 Connection Charging Information	/n2ConnectionChargingInformation
N2 Connection message type	N2 Connection message type	/n2ConnectionChargingInformation/n2ConnectionMessageType
User Information	User Information	/registrationChargingInformation/userInformation
User Identifier	User Identifier	/n2ConnectionChargingInformation/userInformation/servedGPSI
User Equipment Info	User Equipment Info	/n2ConnectionChargingInformation/userInformation/servedPEI
unauthenticatedFlag	unauthenticatedFlag	/n2ConnectionChargingInformation/userInformation/unauthenticatedFlag
User Location Information	User Location Information	/n2ConnectionChargingInformation/userLocationinfo
UE Time Zone	UE Time Zone	/n2ConnectionChargingInformation/uetimeZone
RAT Type	RAT Type	/n2ConnectionChargingInformation/rATType
AMF UE NGAP ID	AMF UE NGAP ID	/n2ConnectionChargingInformation/amfUeNgapId
RAN UE NGAP ID	RAN UE NGAP ID	/n2ConnectionChargingInformation/ranUeNgapId
RAN Node Id	RAN Node Id	/n2ConnectionChargingInformation/ranNodeId
Mobility Restrictions	Mobility Restrictions	/n2ConnectionChargingInformation/restrictedRatList /n2ConnectionChargingInformation/forbiddenAreaList /n2ConnectionChargingInformation/serviceAreaRestriction /n2ConnectionChargingInformation/restrictedCnList
Allowed NSSAI	Allowed NSSAI	/n2ConnectionChargingInformation/allowedNssai
RRC Establishment Cause	RRC Establishment Cause	/n2ConnectionChargingInformation/rrcEstCause
Location Reporting Charging Information	Location Reporting Charging Information	/locationReportingChargingInformation

N2 Connection message type	N2 Connection message type	/locationReportingChargingInformation/n2ConnectionMessageType
User Information	User Information	/locationReportingChargingInformation/userInformation
User Identifier	User Identifier	/locationReportingChargingInformation/userInformation/servedGPSI
User Equipment Info	User Equipment Info	/locationReportingChargingInformation/userInformation/servedPEI
unauthenticatedFlag	unauthenticatedFlag	/locationReportingChargingInformation/userInformation/unauthenticatedFlag
User Location Information	User Location Information	/locationReportingChargingInformation/userLocationinfo
UE Time Zone	UE Time Zone	/locationReportingChargingInformation/uetimeZone
Presence Reporting Area Information	Presence Reporting Area Information	/locationReportingChargingInformation/presenceReportingAreaInformation
RAT Type	RAT Type	/n2ConnectionChargingInformation/rATType
		ChargingDataResponse
-	-	-

7.5 Bindings for Exposure Function Northbound API charging

Table 7.5-1: Bindings of CDR field, Information Element and Resource Attribute for Exposure Function Northbound API charging

Information Element	CDR Field	Resource Attribute
		ChargingDataRequest
Exposure Function API Information	Exposure Function API Information	/nEFChargingInformation
External Identifier	Group Identifier	/nEFChargingInformation/groupIdentifier
API Direction	API Direction	/nEFChargingInformation/aPIDirection
API Target Network Function	API Target Network Function	/nEFChargingInformation/aPITargetNetworkFunction
API Result Code	API Result Code	/nEFChargingInformation/aPIResultCode
API Name	API Name	/nEFChargingInformation/aPIName
API Reference	API Reference	/nEFChargingInformation/aPIReference
API Content	API Content	/nEFChargingInformation/aPIContent
		ChargingDataResponse
-	-	-

7.6 Bindings for NS performance and Analytics charging

Table 7.6-1: Bindings of CDR field, Information Element and Resource Attribute for NS performance and Analytics charging

Information Element	CDR Field	Resource Attribute
		ChargingDataRequest
Tenant Identifier	Tenant Identifier	/tenantIdentifier
Multiple Unit Usage	List of Multiple Unit Usage	/multipleUnitUsage
Used Unit Container	Used Unit Container	/multipleUnitUsage/usedUnitContainer
NSPA Container Information	NSPA Container Information	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation
Latency	Latency	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/latency
Throughput	Throughput	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/throughput
Maximum utilized bandwidth	Maximum utilized bandwidth	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/maximumUtilizedBandwidth
Maximum packet loss rate	Maximum packet loss rate	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/maximumPacketLossRate
Service Experience statistics data	Service Experience statistics data	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/serviceExperienceStatisticsData
The number of PDU sessions	The number of PDU sessions	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/theNumberOfPDUSessions
The number of Registered Subscribers	The number of Registered Subscribers	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/theNumberOfRegisteredSubscribers
Load level	Load level	/multipleUnitUsage/usedUnitContainer/nSPAContainerInformation/loadLevel
NSPA Charging Information	NSPA Charging Information	/nSPAChargingInformation
Single NSSAI	Single NSSAI	/nSPAChargingInformation/singleNSSAI
		ChargingDataResponse
-	-	-

8 Security

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

As indicated in 3GPP TS 33.501 [390] and 3GPP TS 29.500 [299], the access to the Nchf_ ConvergedCharging API and to the Nchf_OfflineOnlyCharging API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [403]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [305]) plays the role of the authorization server.

If OAuth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nchf_ ConvergedCharging API and by the Nchf_OfflineOnlyCharging API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [305], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nchf_ ConvergedCharging service. The same principle applies for Nchf_OfflineOnlyCharging API.

The Nchf_ ConvergedCharging API defines a single scope "nchf-convergedcharging" for the entire service, and it does not define any additional scopes at resource and operation level.

The Nchf_OfflineOnlyCharging API defines a single scope "nchf-offlineonlycharging" for the entire service, and it does not define any additional scopes at resource and operation level.

Annex A (normative): OpenAPI specification

A.1 General

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

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 1: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this document are available on a Git-based repository hosted in ETSI Forge, that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [101] for further information).

A.2 Nchf_ConvergedCharging API

```
openapi: 3.0.0
info:
  title: Nchf_ConvergedCharging
  version: 3.0.0
  description: |
    ConvergedCharging Service    © 2019, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI,
TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 32.291 V16.5.0: Telecommunication management; Charging management;
    5G system, charging service; Stage 3.
  url: 'http://www.3gpp.org/ftp/Specs/archive/32_series/32.291/'
servers:
  - url: '{apiRoot}/nchf-convergedcharging/v3'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 4.4 of 3GPP TS 29.501.
security:
  - {}
  - oAuth2ClientCredentials:
    - nchf-convergedcharging
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/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '403':
          description: Forbidden
          content:
```

```
          application/problem+json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      '404':
        description: Not Found
        content:
          application/problem+json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '410':
        $ref: 'TS29571_CommonData.yaml#/components/responses/410'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
    callbacks:
      chargingNotification:
        '{$request.body#/notifyUri}':
          post:
            requestBody:
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/ChargingNotifyRequest'
            responses:
              '204':
                description: 'No Content, Notification was succesfull'
              '400':
                description: Bad request
                content:
                  application/problem+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/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '403':
          description: Forbidden
          content:
            application/problem+json:
              schema:
```

```
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '404':
          description: Not Found
          content:
            application/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '410':
          $ref: 'TS29571_CommonData.yaml#/components/responses/410'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        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/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '410':
          $ref: 'TS29571_CommonData.yaml#/components/responses/410'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nchf-convergedcharging: Access to the Nchf_ConvergedCharging API
  schemas:
    ChargingDataRequest:
      type: object
      properties:
        subscriberIdentifier:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        tenantIdentifier:
          type: string
        mnSConsumerIdentifier:
          type: string
```

```
      nfConsumerIdentification:
        $ref: '#/components/schemas/NFIdentification'
      invocationTimeStamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      invocationSequenceNumber:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      retransmissionIndicator:
        type: boolean
      oneTimeEvent:
        type: boolean
      oneTimeEventType:
        $ref: '#/components/schemas/oneTimeEventType'
      notifyUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      serviceSpecificationInfo:
        type: string
      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'
      sMSChargingInformation:
        $ref: '#/components/schemas/SMSChargingInformation'
      nEFChargingInformation:
        $ref: '#/components/schemas/NEFChargingInformation'
      registrationChargingInformation:
        $ref: '#/components/schemas/RegistrationChargingInformation'
      n2ConnectionChargingInformation:
        $ref: '#/components/schemas/N2ConnectionChargingInformation'
      locationReportingChargingInformation:
        $ref: '#/components/schemas/LocationReportingChargingInformation'
      nSPAChargingInformation:
        $ref: '#/components/schemas/NSPAChargingInformation'
      nSMChargingInformation:
        $ref: '#/components/schemas/NSMChargingInformation'
    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'
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      multipleUnitInformation:
        type: array
        items:
          $ref: '#/components/schemas/MultipleUnitInformation'
        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
ChargingNotifyRequest:
  type: object
  properties:
    notificationType:
      $ref: '#/components/schemas/NotificationType'
    reauthorizationDetails:
      type: array
      items:
        $ref: '#/components/schemas/ReauthorizationDetails'
      minItems: 0
  required:
    - notificationType
ChargingNotifyResponse:
  type: object
  properties:
    invocationResult:
      $ref: '#/components/schemas/InvocationResult'
NFIdentification:
  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'
    nFFqdn:
      type: string
  required:
    - nodeFunctionality
MultipleUnitUsage:
  type: object
  properties:
    ratingGroup:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RatingGroup'
    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'
Trigger:
  type: object
  properties:
    triggerType:
      $ref: '#/components/schemas/TriggerType'
    triggerCategory:
      $ref: '#/components/schemas/TriggerCategory'
    timeLimit:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    volumeLimit:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    volumeLimit64:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
    maxNumberOfccc:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
  required:
    - triggerType
    - triggerCategory
MultipleUnitInformation:
```

```
    type: object
    properties:
      resultCode:
        $ref: '#/components/schemas/ResultCode'
      ratingGroup:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatingGroup'
      grantedUnit:
        $ref: '#/components/schemas/GrantedUnit'
      triggers:
        type: array
        items:
          $ref: '#/components/schemas/Trigger'
        minItems: 0
      validityTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      quotaHoldingTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      finalUnitIndication:
        $ref: '#/components/schemas/FinalUnitIndication'
      timeQuotaThreshold:
        type: integer
      volumeQuotaThreshold:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
      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: 'TS29571_CommonData.yaml#/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:

        type: array

        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        minItems: 0
      localSequenceNumber:
        type: integer
      pDUContainerInformation:
        $ref: '#/components/schemas/PDUContainerInformation'
      nSPAContainerInformation:
```

```
        $ref: '#/components/schemas/NSPAContainerInformation'
    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:
      serviceId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ServiceId'
      ratingGroup:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatingGroup'
      quotaManagementIndicator:
        $ref: '#/components/schemas/QuotaManagementIndicator'
  PDUSessionChargingInformation:
    type: object
    properties:
      chargingId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ChargingId'
      homeProvidedChargingId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ChargingId'
      userInformation:
        $ref: '#/components/schemas/UserInformation'
      userLocationinfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      mAPDUNon3GPPUserLocationInfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
        minProperties: 0
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      pduSessionInformation:
        $ref: '#/components/schemas/PDUSessionInformation'
      unitCountInactivityTimer:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      rANSecondaryRATUsageReport:
        $ref: '#/components/schemas/RANSecondaryRATUsageReport'
  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'
  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'
      servingNetworkFunctionID:
        $ref: '#/components/schemas/ServingNetworkFunctionID'
      ratType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      mAPDUNon3GPPRATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      dnnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      dnnSelectionMode:
        $ref: '#/components/schemas/dnnSelectionMode'
      chargingCharacteristics:
        type: string
        pattern: '^[0-9a-fA-F]{1,4}$'
      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'
      authorizedQoSInformation:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AuthorizedDefaultQos'
      subscribedQoSInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SubscribedDefaultQos'
      authorizedSessionAMBR:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
      subscribedSessionAMBR:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
      servingCNPlmnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
      mAPDUSessionInformation:
        $ref: '#/components/schemas/MAPDUSessionInformation'
    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: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosData'
      qoSCharacteristics:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosCharacteristics'
      afChargingIdentifier:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ChargingId'
      afChargingIdString:
```

```
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationChargingId'
      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: '#/components/schemas/ServingNetworkFunctionID'
        minItems: 0
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
        minProperties: 0
      3gppPSDataOffStatus:
        $ref: '#/components/schemas/3GPPPSDataOffStatus'
      sponsorIdentity:
        type: string
      applicationserviceProviderIdentity:
        type: string
      chargingRuleBaseName:
        type: string
      mAPDUSteeringFunctionality:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/SteeringFunctionality'
      mAPDUSteeringMode:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/SteeringMode'
  NSPAContainerInformation:
    type: object
    properties:
      latency:
        type: integer
      throughput:
        $ref: '#/components/schemas/Throughput'
      maximumPacketLossRate:
        type: string
      serviceExperienceStatisticsData:
        $ref: 'TS29520_CommonData.yaml#/components/schemas/ServiceExperienceInfo'
      theNumberOfPDUSessions:
        type: integer
      theNumberOfRegisteredSubscribers:
        type: integer
      loadLevel:
        $ref: 'TS29520_CommonData.yaml#/components/schemas/NsiLoadLevelInfo'
  NSPAChargingInformation:
    type: object
    properties:
      singleNSSAI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    required:
      - sNSSAI
  NetworkSlicingInfo:
    type: object
    properties:
      sNSSAI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    required:
      - sNSSAI
  PDUAddress:
    type: object
    properties:
      pduIPv4Address:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
      pduIPv6AddresswithPrefix:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      pduAddressprefixlength:
        type: integer
      iPv4dynamicAddressFlag:
        type: boolean
      iPv6dynamicPrefixFlag:
        type: boolean
  ServingNetworkFunctionID:
    type: object
    properties:
      servingNetworkFunctionInformation:
        $ref: '#/components/schemas/NFIdentification'
```

```
      aMFId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/AmfId'
    required:
      - servingNetworkFunctionInformation
  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'
      downlinkVolume:
        $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'
      reportTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      timeofFirstUsage:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      timeofLastUsage:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      qoSInformation:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosData'
      qoSCharacteristics:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosCharacteristics'
      userLocationInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
        minProperties: 0
      rATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      servingNetworkFunctionID:
        type: array
        items:
          $ref: '#/components/schemas/ServingNetworkFunctionID'
        minItems: 0
      3gppPSDataOffStatus:
        $ref: '#/components/schemas/3GPPPSDataOffStatus'
      3gppChargingId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ChargingId'
      diagnostics:
        $ref: '#/components/schemas/Diagnostics'
      enhancedDiagnostics:
```

```
      type: array
      items:
        type: string
  required:
    - reportTime
RoamingChargingProfile:
  type: object
  properties:
    triggers:
      type: array
      items:
        $ref: '#/components/schemas/Trigger'
      minItems: 0
    partialRecordMethod:
      $ref: '#/components/schemas/PartialRecordMethod'
SMSChargingInformation:
  type: object
  properties:
    originatorInfo:
      $ref: '#/components/schemas/OriginatorInfo'
    recipientInfo:
      type: array
      items:
        $ref: '#/components/schemas/RecipientInfo'
      minItems: 0
    userEquipmentInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
    userLocationinfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
    uetimeZone:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
    rATType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
    sMSCAddress:
      type: string
    sMDataCodingScheme:
      type: integer
    sMMessageType:
      $ref: '#/components/schemas/SMMessageType'
    sMReplyPathRequested:
      $ref: '#/components/schemas/ReplyPathRequested'
    sMUserDataHeader:
      type: string
    sMStatus:
      type: string
    sMDischargeTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    numberofMessagesSent:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    sMServiceType:
      $ref: '#/components/schemas/SMServiceType'
    sMSequenceNumber:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    sMSresult:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    submissionTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    sMPriority:
      $ref: '#/components/schemas/SMPriority'
    messageReference:
      type: string
    messageSize:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    messageClass:
      $ref: '#/components/schemas/MessageClass'
    deliveryReportRequested:
      $ref: '#/components/schemas/DeliveryReportRequested'
OriginatorInfo:
  type: object
  properties:
    originatorSUPI:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    originatorGPSI:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    originatorOtherAddress:
      $ref: '#/components/schemas/SMAddressInfo'
    originatorReceivedAddress:
      $ref: '#/components/schemas/SMAddressInfo'
```

```
      originatorSCCPAddress:
        type: string
      sMOriginatorInterface:
        $ref: '#/components/schemas/SMInterface'
      sMOriginatorProtocolId:
        type: string
  RecipientInfo:
    type: object
    properties:
      recipientSUPI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
      recipientGPSI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      recipientOtherAddress:
        $ref: '#/components/schemas/SMAddressInfo'
      recipientReceivedAddress:
        $ref: '#/components/schemas/SMAddressInfo'
      recipientSCCPAddress:
        type: string
      sMDestinationInterface:
        $ref: '#/components/schemas/SMInterface'
      sMrecipientProtocolId:
        type: string
  SMAddressInfo:
    type: object
    properties:
      sMaddressType:
        $ref: '#/components/schemas/SMAddressType'
      sMaddressData:
        type: string
      sMaddressDomain:
        $ref: '#/components/schemas/SMAddressDomain'
  RecipientAddress:
    type: object
    properties:
      recipientAddressInfo:
        $ref: '#/components/schemas/SMAddressInfo'
      sMaddresseeType:
        $ref: '#/components/schemas/SMAddresseeType'
  MessageClass:
    type: object
    properties:
      classIdentifier:
        $ref: '#/components/schemas/ClassIdentifier'
      tokenText:
        type: string
  SMAddressDomain:
    type: object
    properties:
      domainName:
        type: string
      3GPPIMSIMCCMNC:
        type: string
  SMInterface:
    type: object
    properties:
      interfaceId:
        type: string
      interfaceText:
        type: string
      interfacePort:
        type: string
      interfaceType:
        $ref: '#/components/schemas/InterfaceType'
  RANSecondaryRATUsageReport:
    type: object
    properties:
      rANSecondaryRATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      qosFlowsUsageReports:
        type: array
        items:
          $ref: '#/components/schemas/QosFlowsUsageReport'
  Diagnostics:
    type: integer
  IPFilterRule:
    type: string
  QosFlowsUsageReport:
```

```
      type: object
      properties:
        qFI:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
        startTimestamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        endTimestamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        uplinkVolume:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
        downlinkVolume:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
    NEFChargingInformation:
      type: object
      properties:
        groupIdentifier:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/GroupId'
        aPIDirection:
          $ref: '#/components/schemas/APIDirection'
        aPITargetNetworkFunction:
          $ref: '#/components/schemas/NFIdentification'
        aPIResultCode:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        aPIName:
          type: string
        aPIReference:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        aPIContent:
          type: string
      required:
        - aPIName
    RegistrationChargingInformation:
      type: object
      properties:
        registrationMessagetype:
          $ref: '#/components/schemas/RegistrationMessageType'
        userInformation:
          $ref: '#/components/schemas/UserInformation'
        userLocationinfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        uetimeZone:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
        rATType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
        5GMMCapability:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        mICOModeIndication:
          $ref: '#/components/schemas/MICOModeIndication'
        smsIndication:
          $ref: '#/components/schemas/SmsIndication'
        taiList:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Tai'
          minItems: 0
        serviceAreaRestriction:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/ServiceAreaRestriction'
          minItems: 0
        requestedNSSAI:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          minItems: 0
        allowedNSSAI:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          minItems: 0
        rejectedNSSAI:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          minItems: 0
      required:
        - registrationMessagetype
    N2ConnectionChargingInformation:
```

```
    type: object
    properties:
      n2ConnectionMessageType:
        $ref: '#/components/schemas/N2ConnectionMessageType'
      userInformation:
        $ref: '#/components/schemas/UserInformation'
      userLocationinfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      rATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      amfUeNgapId:
        type: integer
      ranUeNgapId:
        type: integer
      ranNodeId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/GlobalRanNodeId'
      restrictedRatList:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
        minItems: 0
      forbiddenAreaList:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Area'
        minItems: 0
      serviceAreaRestriction:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ServiceAreaRestriction'
        minItems: 0
      restrictedCnList:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/CoreNetworkType'
        minItems: 0
      allowedNSSAI:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        minItems: 0
      rrcEstCause:
        type: string
        pattern: '^[0-9a-fA-F]+$'
    required:
      - n2ConnectionMessageType
  LocationReportingChargingInformation:
    type: object
    properties:
      locationReportingMessageType:
        $ref: '#/components/schemas/LocationReportingMessageType'
      userInformation:
        $ref: '#/components/schemas/UserInformation'
      userLocationinfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      rATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
        minProperties: 0
    required:
      - locationReportingMessageType
  N2ConnectionMessageType:
    type: integer
  LocationReportingMessageType:
    type: integer
  NSMChargingInformation:
    type: object
    properties:
      managementOperation:
        $ref: '#/components/schemas/ManagementOperation'
      idNetworkSliceInstance:
```

```
          type: string
        listOfserviceProfileChargingInformation:
          type: array
          items:
            $ref: '#/components/schemas/ServiceProfileChargingInformation'
          minItems: 0
        managementOperationStatus:
          $ref: '#/components/schemas/ManagementOperationStatus'
# To be introduced once the reference to 'generic.yaml is resolved
#        managementOperationalState:
#          $ref: 'genericNrm.yaml#/components/schemas/OperationalState'
#        managementAdministrativeState:
#          $ref: 'genericNrm.yaml#/components/schemas/AdministrativeState'
      required:
        - managementOperation
    ServiceProfileChargingInformation:
      type: object
      properties:
        serviceProfileIdentifier:
            type: string
        sNSSAIList:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          minItems: 0
# To be introduced once the reference to 'nrNrm.yaml is resolved
#         sST:
#           $ref: 'nrNrm.yaml#/components/schemas/Sst'
        latency:
          type: integer
        availability:
          type: number
# To be introduced once the reference to sliceNrm.yaml is resolved
#         resourceSharingLevel:
#           $ref: 'sliceNrm.yaml#/components/schemas/SharingLevel'
        jitter:
          type: integer
        reliability:
          type: string
        maxNumberofUEs:
          type: integer
        coverageArea:
          type: string
# To be introduced once the reference to sliceNrm.yaml is resolved
#        uEMobilityLevel:
#          $ref: 'sliceNrm.yaml#/components/schemas/MobilityLevel'
#        delayToleranceIndicator:
#          $ref: 'sliceNrm.yaml#/components/schemas/Support'
        dLThptPerSlice:
          $ref: '#/components/schemas/Throughput'
        dLThptPerUE:
          $ref: '#/components/schemas/Throughput'
        uLThptPerSlice:
          $ref: '#/components/schemas/Throughput'
        uLThptPerUE:
          $ref: '#/components/schemas/Throughput'
        maxNumberofPDUsessions:
          type: integer
        kPIMonitoringList:
          type: string
        supportedAccessTechnology:
          type: integer
# To be introduced once the reference to sliceNrm.yaml is resolved
#        v2XCommunicationModeIndicator:
#          $ref: 'sliceNrm.yaml#/components/schemas/Support'
        addServiceProfileInfo:
          type: string
    Throughput:
      type: object
      properties:
        guaranteedThpt:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
        maximumThpt:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    MAPDUSessionInformation:
      type: object
      properties:
        mAPDUSessionIndicator:
```

```
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/MaPduIndication'
    aTSSSCapability:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AtsssCapability'
NotificationType:
  anyOf:
    - type: string
      enum:
        - REAUTHORIZATION
        - ABORT_CHARGING
    - type: string
NodeFunctionality:
  anyOf:
    - type: string
      enum:
        - AMF
        - SMF
        - SMSF
        - SGW
        - I_SMF
        - ePDG
        - CEF
    - 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 # Included for backwards compatibility, shall not be used
        - UNIT_COUNT_INACTIVITY_TIMER
        - ABNORMAL_RELEASE
        - QOS_CHANGE
        - VOLUME_LIMIT
        - TIME_LIMIT
        - EVENT_LIMIT
        - PLMN_CHANGE
        - USER_LOCATION_CHANGE
        - RAT_CHANGE
        - SESSION_AMBR_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
        - INSERTION_OF_ISMF
        - REMOVAL_OF_ISMF
        - CHANGE_OF_ISMF
        - START_OF_SERVICE_DATA_FLOW
        - ECGI_CHANGE
        - TAI_CHANGE
        - HANDOVER_CANCEL
        - HANDOVER_START
        - HANDOVER_COMPLETE
        - GFBR_GUARANTEED_STATUS_CHANGE
        - ADDITION_OF_ACCESS
        - REMOVAL_OF_ACCESS
        - START_OF_SDF_ADDITIONAL_ACCESS
    - 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
        - QUOTA_MANAGEMENT_SUSPENDED
    - 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:
        - SUCCESS
        - END_USER_SERVICE_DENIED
        - QUOTA_MANAGEMENT_NOT_APPLICABLE
        - QUOTA_LIMIT_REACHED
        - END_USER_SERVICE_REJECTED
        - USER_UNKNOWN
        - RATING_FAILED
        - QUOTA_MANAGEMENT
    - type: string
PartialRecordMethod:
  anyOf:
    - type: string
      enum:
        - DEFAULT
        - INDIVIDUAL
    - type: string
RoamerInOut:
  anyOf:
    - type: string
      enum:
        - IN_BOUND
        - OUT_BOUND
    - type: string
SMMessageType:
```

```
      anyOf:
        - type: string
          enum:
            - SUBMISSION
            - DELIVERY_REPORT
            - SM_SERVICE_REQUEST
        - type: string
    SMPriority:
      anyOf:
        - type: string
          enum:
            - LOW
            - NORMAL
            - HIGH
        - type: string
    DeliveryReportRequested:
      anyOf:
        - type: string
          enum:
            - YES
            - NO
        - type: string
    InterfaceType:
      anyOf:
        - type: string
          enum:
            - UNKNOWN
            - MOBILE_ORIGINATING
            - MOBILE_TERMINATING
            - APPLICATION_ORIGINATING
            - APPLICATION_TERMINATING
        - type: string
    ClassIdentifier:
      anyOf:
        - type: string
          enum:
            - PERSONAL
            - ADVERTISEMENT
            - INFORMATIONAL
            - AUTO
        - type: string
    SMAddressType:
      anyOf:
        - type: string
          enum:
            - EMAIL_ADDRESS
            - MSISDN
            - IPV4_ADDRESS
            - IPV6_ADDRESS
            - NUMERIC_SHORTCODE
            - ALPHANUMERIC_SHORTCODE
            - OTHER
            - IMSI
        - type: string
    SMAddresseeType:
      anyOf:
        - type: string
          enum:
            - TO
            - CC
            - BCC
        - type: string
    SMServiceType:
      anyOf:
        - type: string
          enum:
            - VAS4SMS_SHORT_MESSAGE_CONTENT_PROCESSING
            - VAS4SMS_SHORT_MESSAGE_FORWARDING
            - VAS4SMS_SHORT_MESSAGE_FORWARDING_MULTIPLE_SUBSCRIPTIONS
            - VAS4SMS_SHORT_MESSAGE_FILTERING
            - VAS4SMS_SHORT_MESSAGE_RECEIPT
            - VAS4SMS_SHORT_MESSAGE_NETWORK_STORAGE
            - VAS4SMS_SHORT_MESSAGE_TO_MULTIPLE_DESTINATIONS
            - VAS4SMS_SHORT_MESSAGE_VIRTUAL_PRIVATE_NETWORK(VPN)
            - VAS4SMS_SHORT_MESSAGE_AUTO_REPLY
            - VAS4SMS_SHORT_MESSAGE_PERSONAL_SIGNATURE
            - VAS4SMS_SHORT_MESSAGE_DEFERRED_DELIVERY
        - type: string
```

```
    ReplyPathRequested:
      anyOf:
        - type: string
          enum:
            - NO_REPLY_PATH_SET
            - REPLY_PATH_SET
        - type: string
    oneTimeEventType:
      anyOf:
        - type: string
          enum:
            - IEC
            - PEC
        - type: string
    dnnSelectionMode:
      anyOf:
        - type: string
          enum:
            - VERIFIED
            - UE_DNN_NOT_VERIFIED
            - NW_DNN_NOT_VERIFIED
        - type: string
    APIDirection:
      anyOf:
        - type: string
          enum:
            - INVOCATION
            - NOTIFICATION
        - type: string
    RegistrationMessageType:
      anyOf:
        - type: string
          enum:
            - INITIAL
            - MOBILITY
            - PERIODIC
            - EMERGENCY
            - DEREGISTRATION
        - type: string
    MICOModeIndication:
      anyOf:
        - type: string
          enum:
            - MICO_MODE
            - NO_MICO_MODE
        - type: string
    SmsIndication:
      anyOf:
        - type: string
          enum:
            - SMS_SUPPORTED
            - SMS_NOT_SUPPORTED
        - type: string
    ManagementOperation:
      anyOf:
        - type: string
          enum:
            - CreateMOI
            - ModifyMOIAttributes
            - DeleteMOI
        - type: string
    ManagementOperationStatus:
      anyOf:
        - type: string
          enum:
            - OPERATION_SUCCEEDED
            - OPERATION_FAILED
        - type: string
```

A.3 Nchf_OfflineOnlyCharging API

```
openapi: 3.0.0
info:
  title: Nchf_OfflineOnlyCharging
```

```
  version: 1.0.0
  description: |
    OfflineOnlyCharging Service
    © 2019, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 32.291 V16.5.0: Telecommunication management; Charging management;
    5G system, charging service; Stage 3.
  url: 'http://www.3gpp.org/ftp/Specs/archive/32_series/32.291/'
servers:
  - url: '{apiRoot}/nchf-offlineonlycharging/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 4.4 of 3GPP TS 29.501.
security:
  - {}
  - oAuth2ClientCredentials:
    - nchf-offlineonlycharging
paths:
  /offlinechargingdata:
    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'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '410':
          $ref: 'TS29571_CommonData.yaml#/components/responses/410'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  '/offlinechargingdata/{OfflineChargingDataRef}/update':
    post:
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ChargingDataRequest'
      parameters:
        - name: OfflineChargingDataRef
```

```
        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'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '410':
        $ref: 'TS29571_CommonData.yaml#/components/responses/410'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
'/offlinechargingdata/{OfflineChargingDataRef}/release':
  post:
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ChargingDataRequest'
    parameters:
      - name: OfflineChargingDataRef
        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'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '410':
        $ref: 'TS29571_CommonData.yaml#/components/responses/410'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
```

```
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nchf-offlineonlycharging: Access to the Nchf_OfflineOnlyCharging API
  schemas:
    ChargingDataRequest:
      type: object
      properties:
        subscriberIdentifier:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        nfConsumerIdentification:
          $ref: '#/components/schemas/NFIdentification'
        invocationTimeStamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        invocationSequenceNumber:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        retransmissionIndicator:
          type: boolean
        serviceSpecificationInfo:
          type: string
        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'
        triggers:
          type: array
          items:
            $ref: '#/components/schemas/Trigger'
          minItems: 0
        pDUSessionChargingInformation:
          $ref: '#/components/schemas/PDUSessionChargingInformation'
        roamingQBCInformation:
          $ref: '#/components/schemas/RoamingQBCInformation'
      required:
        - invocationTimeStamp
        - invocationSequenceNumber
    NFIdentification:
      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'
    nFFqdn:
      type: string
  required:
    - nodeFunctionality
MultipleUnitUsage:
  type: object
  properties:
    ratingGroup:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RatingGroup'
    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'
Trigger:
  type: object
  properties:
    triggerType:
      $ref: '#/components/schemas/TriggerType'
    triggerCategory:
      $ref: '#/components/schemas/TriggerCategory'
    timeLimit:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    volumeLimit:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
    volumeLimit64:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
    maxNumberOfccc:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
  required:
    - triggerType
    - triggerCategory
UsedUnitContainer:
  type: object
  properties:
    serviceId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ServiceId'
    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:
      type: array

      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      minItems: 0
    localSequenceNumber:
      type: integer
```

```
      pDUContainerInformation:
        $ref: '#/components/schemas/PDUContainerInformation'
    required:
      - localSequenceNumber
  PDUSessionChargingInformation:
    type: object
    properties:
      chargingId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ChargingId'
      userInformation:
        $ref: '#/components/schemas/UserInformation'
      userLocationinfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      mAPDUNon3GPPUserLocationInfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      userLocationTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
        minProperties: 0
      uetimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      pduSessionInformation:
        $ref: '#/components/schemas/PDUSessionInformation'
      unitCountInactivityTimer:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      rANSecondaryRATUsageReport:
        $ref: '#/components/schemas/RANSecondaryRATUsageReport'
    required:
      - 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'
  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'
      servingNetworkFunctionID:
        $ref: '#/components/schemas/ServingNetworkFunctionID'
      ratType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      mAPDUNon3GPPRATType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      dnnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      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'
      authorizedQoSInformation:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AuthorizedDefaultQos'
      subscribedQoSInformation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SubscribedDefaultQos'
      authorizedSessionAMBR:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
      subscribedSessionAMBR:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
      servingCNPlmnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
      mAPDUSessionInformation:
        $ref: '#/components/schemas/MAPDUSessionInformation'
    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: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosData'
      qoSCharacteristics:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosCharacteristics'
      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: '#/components/schemas/ServingNetworkFunctionID'
        minItems: 0
      presenceReportingAreaInformation:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
        minProperties: 0
      3gppPSDataOffStatus:
        $ref: '#/components/schemas/3GPPPSDataOffStatus'
      sponsorIdentity:
        type: string
      applicationserviceProviderIdentity:
        type: string
      chargingRuleBaseName:
        type: string
      mAPDUSteeringFunctionality:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/SteeringFunctionality'
      mAPDUSteeringMode:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/SteeringMode'
  NetworkSlicingInfo:
    type: object
    properties:
      sNSSAI:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    required:
      - sNSSAI
  PDUAddress:
    type: object
    properties:
      pduIPv4Address:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
      pduIPv6AddresswithPrefix:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      pduAddressprefixlength:
        type: integer
      iPv4dynamicAddressFlag:
        type: boolean
      iPv6dynamicPrefixFlag:
        type: boolean
```

```
    ServingNetworkFunctionID:
      type: object
      properties:
        servingNetworkFunctionInformation:
          $ref: '#/components/schemas/NFIdentification'
        aMFId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AmfId'
      required:
        - servingNetworkFunctionInformation
    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: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosData'
        qoSCharacteristics:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/QosCharacteristics'
        userLocationInformation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        uetimeZone:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
        presenceReportingAreaInformation:
          type: object
          additionalProperties:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
          minProperties: 0
        rATType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
        servingNetworkFunctionID:
          type: array
          items:
            $ref: '#/components/schemas/ServingNetworkFunctionID'
          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'
RANSecondaryRATUsageReport:
  type: object
  properties:
    rANSecondaryRATType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
    qosFlowsUsageReports:
      type: array
      items:
        $ref: '#/components/schemas/QosFlowsUsageReport'
Diagnostics:
  type: integer
IPFilterRule:
  type: string
QosFlowsUsageReport:
  type: object
  properties:
    qFI:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
    startTimestamp:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    endTimestamp:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    uplinkVolume:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
    downlinkVolume:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
MAPDUSessionInformation:
  type: object
  properties:
    mAPDUSessionIndicator:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/MaPduIndication'
    aTSSSCapability:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AtsssCapability'
NodeFunctionality:
  anyOf:
    - type: string
      enum:
        - SMF
        - SMSF
    - type: string
ChargingCharacteristicsSelectionMode:
  anyOf:
    - type: string
      enum:
        - HOME_DEFAULT
        - ROAMING_DEFAULT
        - VISITING_DEFAULT
    - type: string
TriggerType:
  anyOf:
    - type: string
      enum:
        - FINAL
        - ABNORMAL_RELEASE
        - QOS_CHANGE
        - VOLUME_LIMIT
        - TIME_LIMIT
        - EVENT_LIMIT
        - PLMN_CHANGE
        - USER_LOCATION_CHANGE
        - RAT_CHANGE
        - SESSION_AMBR_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
        - INSERTION_OF_ISMF
```

```
        - REMOVAL_OF_ISMF
        - CHANGE_OF_ISMF
        - START_OF_SERVICE_DATA_FLOW
        - GFBR_GUARANTEED_STATUS_CHANGE
        - ADDITION_OF_ACCESS
        - REMOVAL_OF_ACCESS
        - START_OF_SDF_ADDITIONAL_ACCESS
    - type: string
TriggerCategory:
  anyOf:
    - type: string
      enum:
        - IMMEDIATE_REPORT
        - DEFERRED_REPORT
    - 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:
        - SUCCESS
        - END_USER_SERVICE_DENIED
    - 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**
2018-09	SA#81					Upgrade to change control version	15.0.0
2018-12	SA#82	SP-181157	0001	1	F	Correction on the Reference and Resource name	15.1.0
2018-12	SA#82	SP-181157	0002	1	F	Editorial Correction	15.1.0
2018-12	SA#82	SP-181157	0003	1	F	Data Type Applicability Correction	15.1.0
2018-12	SA#82	SP-181059	0004	1	F	Serving Node ID Correction	15.1.0
2018-12	SA#82	SP-181059	0006	1	F	Correction of Common Data reference in Nchf_ConvergedCharging API	15.1.0
2018-12	SA#82	SP-181059	0007	1	F	Correction of references to TS 29.512, TS 29.514 and data types	15.1.0
2018-12	SA#82	SP-181059	0008	1	F	Clarification of requested units handling	15.1.0
2018-12	SA#82	SP-181059	0009	1	F	Remove of underscore in the API name	15.1.0
2018-12	SA#82	SP-181059	0010	1	F	Correction of data type for subscriber identifier	15.1.0
2018-12	SA#82	SP-181059	0011	-	F	Correction of response code in flow for Notify	15.1.0
2018-12	SA#82	SP-181059	0012	1	F	Allow updating of Notify URI	15.1.0
2018-12	SA#82	SP-181059	0013	1	F	Correction of overlapping results between Invocation result and Result code	15.1.0
2018-12	SA#82	SP-181059	0014	1	F	Correction of Invocation result at http ok	15.1.0
2018-12	SA#82	SP-181059	0015	1	F	Correction of Rating Group Id and Service Id to Uint32	15.1.0
2018-12	SA#82	SP-181059	0016	1	F	Correction of name for Multiple Unit Information	15.1.0
2018-12	SA#82	SP-181059	0018	1	F	Correction of name for Multiple Unit Information	15.1.0
2018-12	SA#82	SP-181059	0019	1	F	Correction of missing http status code	15.1.0
2018-12	SA#82	SP-181052	0020	1	B	Addition of event based charging	15.1.0
2018-12	SA#82	SP-181057	0021	1	B	Introduction Data Volume Reporting for Option 4&7	15.1.0
2018-12	SA#82	SP-181059	0022	1	F	Alignment for session identifier	15.1.0
2018-12	SA#82	SP-181059	0023	1	F	Correction on Charging Notification message	15.1.0
2018-12	SA#82	SP-181059	0024	1	F	Correction on Charging ID data type	15.1.0
2018-12	SA#82	SP-181059	0025	1	F	Correction on Reauthorizationdetails	15.1.0
2018-12	SA#82	SP-181052	0026	2	B	Data Type for SMS	15.1.0
2018-12	SA#82	SP-181052	0027	1	B	Introduce Binding for SMS charging	15.1.0
2018-12	SA#82	SP-181052	0028	1	B	Introduce OpenAPI extension for SMS charging	15.1.0
2018-12	SA#82	SP-181059	0029	-	F	Failure Handling Mechanism Clarification	15.1.0
2018-12	SA#82	SP-181059	0030	-	F	Correction of Serving Network Function ID definition	15.1.0
2019-03	SA#83	SP-190116	0031	1	F	Correction of create operation description for event	15.2.0
2019-03	SA#83	SP-190115	0032	1	F	Correction of data type associated to volume	15.2.0
2019-03	SA#83	SP-190214	0033	3	F	Correction on reference for common data types	15.2.0
2019-03	SA#83	SP-190116	0034	1	F	Correction of inconsistencies in data types	15.2.0
2019-03	SA#83	SP-190116	0035	1	F	Correction of NF Consumer Information	15.2.0

2019-03	SA#83	SP-190117	0036	-	F	Correction of SMSF as NF Consumer	15.2.0
2019-03	SA#83	SP-190116	0037	-	F	Correction of validityTime data type	15.2.0
2019-03	SA#83	SP-190116	0038	1	F	Correction of API versioning and externalDocs field	15.2.0
2019-03	SA#83	SP-190212	0039	4	F	Correction of Qos Information	15.2.0
2019-03	SA#83	SP-190116	0040	1	F	Correct missing Session Identifier	15.2.0
2019-03	SA#83	SP-190116	0041	1	F	Correct faults in yaml part	15.2.0
2019-03	SA#83	SP-190115	0042	1	F	Correction of User Information	15.2.0
2019-03	SA#83	SP-190115	0043	-	F	Correction of dnn data type	15.2.0
2019-03	SA#83	SP-190213	0044	3	F	Correction of serving Network Function	15.2.0
2019-03	SA#83	SP-190116	0045	1	F	Correction of Multiple Unit Information in ChargingDataResponse	15.2.0
2019-03	SA#83	SP-190116	0046	1	F	Correction of trigger in ChargingDataResponse	15.2.0
2019-03	SA#83	SP-190116	0048	1	F	Correction of RANSecondaryRATUsageReport occurrence	15.2.0
2019-03	SA#83	SP-190116	0052	-	F	Correcting of table for bindings	15.2.0
2019-03	SA#83	SP-190115	0054	1	F	Correction of UE IP Addresses	15.2.0
2019-03	SA#83	SP-190116	0055	-	F	Correction on local sequence nb	15.2.0
2019-03	SA#83					Editorial corrections in the OPENAPI (MCC)	15.2.1
2019-06	SA#84	SP-190384	0057	-	F	Add the reference for SMS charging	15.3.0
2019-06	SA#84	SP-190384	0058	1	F	Correct the failure handling	15.3.0
2019-06	SA#84	SP-190384	0063	1	F	Correction on errors description	15.3.0
2019-06	SA#84	SP-190384	0064	-	F	Correction on Gateway timeout code	15.3.0
2019-06	SA#84	SP-190384	0065	-	F	Correction of used unit container attributes	15.3.0
2019-06	SA#84	SP-190383	0066	1	F	Correction on binding	15.3.0
2019-06	SA#84	SP-190383	0067	-	F	Correction of trigger type for start of service data flow	15.3.0
2019-06	SA#84	SP-190383	0068	1	F	Correction of trigger type unit count inactivity timer	15.3.0
2019-06	SA#84	SP-190383	0069	1	F	Correction of Nchf_ConvergedCharging release usage	15.3.0
2019-06	SA#84	SP-190383	0070	1	F	Correction of missing http status codes	15.3.0
2019-06	SA#84	SP-190522	0072	-	F	Correction on the OpenAPI version	15.3.0
2019-06	SA#84	SP-190381	0056	1	B	Definition of data model for interworking with EPC	16.0.0
2019-06	SA#84	SP-190382	0059	1	B	Add Offline only charging service API name	16.0.0
2019-06	SA#84	SP-190382	0060	1	B	Add Offline only charging service API resource definition	16.0.0
2019-06	SA#84	SP-190382	0061	1	B	Add Offline only charging service API data model	16.0.0
2019-06	SA#84	SP-190382	0062	1	B	Add Offline only charging service API error handling	16.0.0
2019-06	SA#84	SP-190382	0071	-	B	Add Offline only charging service operations	16.0.0
2019-09	SA#85	SP-190757	0073	1	B	Modify the Charging ID	16.1.0
2019-09	SA#85	SP-190757	0074	1	B	Definition of data model for interworking with EPC	16.1.0

2019-09	SA#85	SP-190758	0075	1	B	Correct Offline only charging service API resource definition	16.1.0
2019-09	SA#85	SP-190758	0076	1	B	Add Offline only charging service API data model	16.1.0
2019-09	SA#85	SP-190758	0077	1	B	Add Simple data types and enumerations for offline only charging service API data model	16.1.0
2019-09	SA#85	SP-190758	0078	1	B	Add Bindings of common CDR field for Offline only charging service API	16.1.0
2019-09	SA#85	SP-190758	0079	1	B	Add Offline only charging open API schema	16.1.0
2019-09	SA#85	SP-190854	0080	2	B	Update Open API for interworking	16.1.0
2019-09	SA#85	SP-190761	0082	1	A	Correction of nfConsumerIdentification and usedUnitContainer	16.1.0
2019-09	SA#85	SP-190762	0084	1	A	Correction of TriggerCategory and Triggers	16.1.0
2019-09	SA#85	SP-190762	0086	1	A	Correction of Report Time in QFI Container Information	16.1.0
2019-09	SA#85	SP-190762	0088	1	A	Correction of SubscriptionIdentificationType	16.1.0
2019-09	SA#85	SP-190762	0092	1	A	Correction of multipleQuotaInformation	16.1.0
2019-09	SA#85	SP-190762	0094	1	A	Correction of HTTP Status Codes	16.1.0
2019-09	SA#85	SP-190762	0110	-	A	Correct the QoS change trigger	16.1.0
2019-09	SA#85	SP-190762	0111	1	A	Add the selection mode in PDU session information	16.1.0
2019-09	SA#85	SP-190762	0114	1	A	Event based charging mechanism	16.1.0
2019-09	SA#85	SP-190840	0115	1	A	Bindings of common field correction	16.1.0
2019-09	SA#85	SP-190840	0116	1	A	Coordination of attribute Presence condition	16.1.0
2019-09	SA#85	SP-190840	0117	1	A	Bindings for 5G data connectivity correction	16.1.0
2019-09	SA#85	SP-190840	0118	1	A	Correction of data structure of response body	16.1.0
2019-09	SA#85	SP-190840	0119	-	A	Correction of serving Network Function identifier	16.1.0
2019-09	SA#85	SP-190750	0122	1	F	Correction of AF Charging Identifier naming	16.1.0
2019-09	SA#85	SP-190840	0124	-	A	Corrections on OpenAPI	16.1.0
2019-09	SA#85	SP-190750	0126	-	B	Correction on OpenAPI version	16.1.0
2019-09	SA#85	SP-190762	0127	-	A	Correction of version numbering	16.1.0
2019-09	SA#85					Correction of history table and adding correct version of CR 0080 (MCC)	16.1.1
2019-12	SA#86	SP-191162	0144	1	A	Add the Service Specification Information	16.2.0
2019-12	SA#86	SP-191159	0145	1	F	Add the QoS characteristics	16.2.0
2019-12	SA#86	SP-191161	0146	1	A	Add the QNC support	16.2.0
2019-12	SA#86	SP-191161	0147	3	A	Clarify the QoS change trigger	16.2.0
2019-12	SA#86	SP-191161	0150	1	A	Correction of Nchf_ConvergedCharging_Release operation	16.2.0
2019-12	SA#86	SP-191161	0151	-	A	Correction of subscriberIdentifier	16.2.0
2019-12	SA#86	SP-191159	0152	1	F	Corrections on OpenAPI for UsedUnitContainer	16.2.0
2019-12	SA#86	SP-191153	0153	2	B	Introduce AMF in Nchf Converged Charging	16.2.0
2019-12	SA#86	SP-191159	0154	1	F	Add Retransmission IE for alignment with TS 32.290	16.2.0
2019-12	SA#86	SP-191161	0156	1	A	Correction InvocationResult description and binding	16.2.0

2019-12	SA#86	SP-191159	0157	1	F	Correction of yaml	16.2.0
2019-12	SA#86	SP-191159	0158	1	F	Correction of pDUSessionChargingInformation	16.2.0
2019-12	SA#86	SP-191154	0159	1	B	Adding Exposure Function Northbound API Specified Data Type	16.2.0
2019-12	SA#86	SP-191161	0163	1	A	Alignment with TS 29.501 template	16.2.0
2019-12	SA#86	SP-191153	0164	-	B	Introduce OpenAPI for AMF charging	16.2.0
2019-12	SA#86	SP-191161	0171	1	A	Correction of Notify Response	16.2.0
2019-12	SA#86	SP-191205	0173	2	A	Correction of ChargingNotifyResponse description	16.2.0
2019-12	SA#86	SP-191161	0175	1	A	Correction on the Resource URI	16.2.0
2019-12	SA#86	SP-191167	0179	1	B	Adding I-SMF related trigger type	16.2.0
2019-12	SA#86	SP-191167	0180	1	B	Add I-SMF as a new serving network function	16.2.0
2019-12	SA#86	SP-191203	0183	2	A	Add Session-AMBR change trigger	16.2.0
2019-12	SA#86	SP-191154	0186	1	B	Addition of binding for exposure function northbound API	16.2.0
2019-12	SA#86	SP-191154	0187	1	B	Addition of attributes in yaml for exposure function northbound API	16.2.0
2019-12	SA#86	SP-191161	0189	-	A	Correction to NF consumer identification	16.2.0
2019-12	SA#86	SP-191161	0191	1	A	Correction of binding for 5G data connectivity	16.2.0
2019-12	SA#86	SP-191159	0192	-	F	Correction OpenAPI syntax	16.2.0
2019-12	SA#86	SP-191153	0193	1	B	Introduction of Binding for AMF Charging	16.2.0
2019-12	SA#86	SP-191167	0194	1	B	Add serving node information	16.2.0
2019-12	SA#86	SP-191339	0198	1	F	Update OpenAPI version	16.2.0
2020-03	SA#87E	SP-200170	0199	-	F	Update of Serving Network Function ID	16.3.0
2020-03	SA#87E	SP-200248	0208	1	F	Correct the style for TriggerType in OpenAPI	16.3.0
2020-03	SA#87E	SP-200166	0209	-	B	Update OpenAPI version	16.3.0
2020-07	SA#88E	SP-200510	0216	-	A	Missing AMF as network function	16.4.0
2020-07	SA#88E	SP-200484	0217	1	F	Missing event limit in trigger type	16.4.0
2020-07	SA#88E	SP-200484	0219	-	F	Missing downlink volume in QFI container	16.4.0
2020-07	SA#88E	SP-200484	0220	-	F	Correction of content problem, callback and version	16.4.0
2020-07	SA#88E	SP-200522	0221	2	F	Add the Retransmission Indicator in Open API	16.4.0
2020-07	SA#88E	SP-200484	0224	1	B	Add the reference about the storage of OPENAPI in FORGE	16.4.0
2020-07	SA#88E	SP-200505	0226	1	B	Add description on identifier for 5G RG and FN RG	16.4.0
2020-07	SA#88E	SP-200507	0228	1	F	Correction of NodeFunctionality	16.4.0
2020-07	SA#88E	SP-200485	0231	-	B	Introduce TS 29.500 and TS 29.501 full applicability	16.4.0
2020-07	SA#88E	SP-200485	0232	1	F	Correct the PDU address	16.4.0
2020-07	SA#88E	SP-200485	0233	1	F	Correct the Charging Data Response for NEF charging	16.4.0
2020-07	SA#88E	SP-200485	0237	1	F	Correct offline only charging service API due to maintainance	16.4.0
2020-07	SA#88E	SP-200485	0240	1	F	Correcting pduSessionInformation as optional	16.4.0

2020-07	SA#88E	SP-200508	0242	-	B	Adding CHFCQM as supported feature	16.4.0
2020-07	SA#88E	SP-200486	0244	-	A	Open API version Update	16.4.0
2020-07	SA#88E					Adding the yaml file to the zip	16.4.1
2020-07	SA#88E					Addressing two implementation errors in the annex Nchf_ OfflineOnlyCharging API	16.4.2
2020-09	SA#89e	SP-200740	0245	1	F	Clarify Charging information 5GC interworking with EPC	16.5.0
2020-09	SA#89e	SP-200813	0246	-	F	Corrections in names and cardinality for attributes	16.5.0
2020-09	SA#89e	SP-200813	0247	1	F	Authorization of CHF services access by OAuth 2.0	16.5.0
2020-09	SA#89e	SP-200733	0248	1	B	Introduction of ATSSS	16.5.0
2020-09	SA#89e	SP-200745	0249	1-	B	Introduction of NSM charging information	16.5.0
2020-09	SA#89e	SP-200742	0251	-	F	Charging characteristics not consistently defined	16.5.0
2020-09	SA#89e	SP-200813	0252	1	F	Correction of missing AF Charging Id in string format	16.5.0
2020-09	SA#89e	SP-200813	0254	-	F	Correction to tariffTimeChange with UTC time	16.5.0
2020-09	SA#89e	SP-200741	0256	1	F	Missing suspend of quota management	16.5.0
2020-09	SA#89e	SP-200743	0261	1	B	Add the NSPA charging attribute for convergedcharging service	16.5.0
2020-09	SA#89e	SP-200817	0262	1	F	Add timeLimit and eventLimit	16.5.0
2020-09	SA#89e	SP-200813	0263	1	F	Update cardinality for event time stamps	16.5.0
2020-09	SA#89e	SP-200742	0265	1	A	Correction on Converged Charging and Requested Unit handling	16.5.0
2020-09	SA#89e	SP-200740	0267	-	F	Add ePDG as serving node	16.5.0
2020-09	SA#89e	SP-200742	0268	-	A	Update OpenAPI version	16.5.0
2020-09	SA#89e					Correction of various CR implementation errors	16.5.1

History

Document history		
V16.4.2	August 2020	Publication
V16.5.1	November 2020	Publication