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Contents

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is (or any other verb in the indicative mood) indicates a statement of fact

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The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the stage 3 protocol and data model for the Nnef Service Based South-Bound Interfaces for NIDD. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the NEF.

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

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

2 References

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

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

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

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

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

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

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

[6] OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[7] 3GPP TR 21.900: "Technical Specification Group working methods".

[8] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[10] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

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

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

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

[14] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[15] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[16] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[17] 3GPP TS 29.542: "5G System; Session management services for Non-IP Data Delivery (NIDD); Stage 3".

[18] 3GPP TS 23.540: "5G System; Technical realization of Service Based Short Message Service Stage 2".

[19] 3GPP TS 29.577: "5G System; IP Short Message Gateway and SMS Router For Short Message Service; Stage 3".

[20] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[21] 3GPP TS 24.011: " Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

3 Definitions, symbols and abbreviations

3.1 Terms

Void.

3.2 Symbols

Void.

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].

DNN	Data Network Name
MO	Mobile Originated
NEF	Network Exposure Function
NIDD	Non-IP Data Delivery
SM	Session Management
SMF	Session Management Function
NSSAI	Network Slice Selection Assistance Information
RDS	Reliable Data Service
SUPI	Subscription Permanent Identifier

4 Overview

4.1 Introduction

Within the 5GC, the NEF offers NIDD services to the NF (e.g. SMF) or the NEF offers MO SMS service to the NF (e.g. SMS-SC) via the Nnef service based southbound interface (see 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.540 [18]).

Figure 4.1-1 provides the reference model (in service based interface representation and in reference point representation), with focus on the NEF and the scope of the present specification.

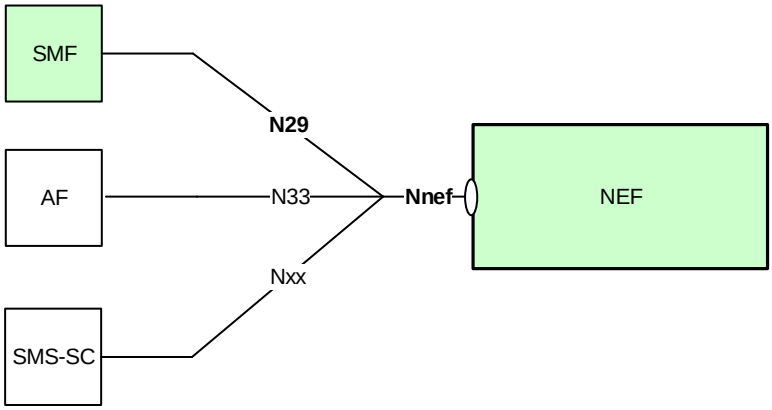

Figure 4.1-1: Reference model – NEF

The functionalities supported by the NEF are listed in clause 6.2.5 of 3GPP TS 23.501 [2].

5 Services offered by the NEF for NIDD and SMS

5.1 Introduction

The table 5.1-1 shows the NEF Services and Service Operations for NIDD and SMS:

Table 5.1-1 List of NEF Services for NIDD and SMS

Service Name	Service Operations	Operation Semantics	Example Consumer(s)	Mapped Service Operation
Nnef_SMContext	Create	Request/Response	SMF	Nnef_SMContext_Create
	Delete	Request/Response	SMF	Nnef_SMContext_Delete
	Status Notify	Subscribe/Notify	SMF	Nnef_SMContext_DeleteNotify (NOTE)
	Update	Request/Response	SMF	
	Delivery	Request/Response	SMF	Nnef_SMContext_Delivery
Nnef_SMService	MoForwardSm	Request/Response	SMS-SC	Nnef_SMService_MoForwardSm
NOTE: The Status Notify service operation models the Nnef_SMContext_DeleteNotify service operation specified in 3GPP TS 23.502 [3] (see clause 5.2.2.4.2).				

Table 5.1-2 summarizes the corresponding APIs defined for this specification.

Table 5.1-2: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Nnef_SMContext	6.1	Nnef SMContext Service	TS29541_Nnef_SMContext.yaml	nnef-smcontext	A.2
Nnef_SMService	6.2	Nnef SMService Service	TS29541_Nnef_SMService.yaml	nnef-smservice	A.3

5.2 Nnef_SMContext Service

5.2.1 Service Description

The service allows a NF to manage the SM Contexts on NEF for NIDD. A NF as service consumer (e.g. SMF) can create, update or release SM Contexts for NIDD on NEF. A created SM Context for NIDD may also be released by NEF.

5.2.2 Service Operations

5.2.2.1 Introduction

The Nnef_SMContext service supports following service operations:

- Create
- Delete
- StatusNotify
- Update
- Deliver

5.2.2.2 Create Service Operation

5.2.2.2.1 General

The Create service operation is used during the following procedure:

- SMF-NEF Connection Establishment procedure (see 3GPP TS 23.502 [3], clause 4.25.2)

The Create service operation is invoked by a NF Service Consumer (e.g. a SMF) towards the NEF, when the SMF received a PDU Session establishment request from the UE with PDU Session type of "Unstructured", and the subscription information corresponding to the UE requested DNN includes the "NEF Identity for NIDD". There shall be only one individual SM context per PDU session.

The NF Service Consumer (e.g. the SMF) shall create the SM Context for NIDD on NEF by sending the HTTP POST request towards the SM Contexts Collection resource as shown in Figure 5.2.2.2.1-1.

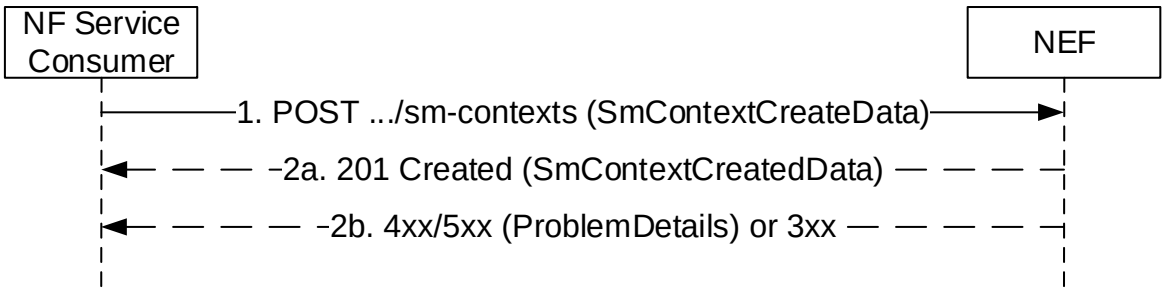

Figure 5.2.2.2.1-1: Create Service Operation

1. The NF Service Consumer shall send a POST request to the resource representing the SM Contexts Collection resource of the NEF with a "SmContextCreateData" object in request body, including:
   - SUPI of the UE;
   - PDU session ID;
   - S-NSSAI associated with the PDU session;

- DNN of the PDU session;
- NIDD information, such as GPSI, AF ID, etc.;
- NEF ID, indicating the provisioned identity for NIDD service;
- URI of the Individual PDU session resource for downlink data delivery (see clause 6.1.3.2 of 3GPP TS 29.542 [17]);
- Notification URI to receive the SM Context notifications;
- optionally the indication of UE capability to support Reliable Data Service (RDS);
- optionally the configuration parameters, e.g. serving PLMN rate control, small data rate control, etc.;
- optionally small data rate control status, if small data rate control is previously enabled and to be resumed

2a. On success, "201 Created" shall be returned and the "Location" header shall be present and shall contain the URI of the created Individual SM Context resource.

The payload body of the POST response shall contain a "SmContextCreatedData" object, including:

- SUPI of the UE;
- PDU session ID;
- S-NSSAI associated with the PDU session;
- DNN of the PDU session;
- NEF ID, indicating the provisioned identity for NIDD service;
- optionally the indication of NEF capability to support Reliable Data Service (RDS);
- optionally the indication of NEF capability to support Extended Buffering;
- optionally Maximum Packet Size in bytes for NIDD data packet.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.2.3.1-3 shall be returned, the response body should contain a "ProblemDetails" object with "cause" attribute set to one of the application errors listed in Table 6.1.3.2.3.1-3.

5.2.2.3 Delete Service Operation

5.2.2.3.1 General

The Delete service operation is used during the following procedure:

- SMF Initiated SMF-NEF Connection Release procedure (see 3GPP TS 23.502 [3], clause 4.25.7)

The Delete service operation is invoked by a NF Service Consumer (e.g. a SMF) towards the NEF, when the PDU Session Release is initiated and a SM context for NIDD has been previously created on NEF for the PDU session.

The NF Service Consumer (e.g. the SMF) shall delete the SM Context for NIDD on NEF by invoking the "release" custom operation on the Individual SM Context resource as shown in Figure 5.2.2.3.1-1.

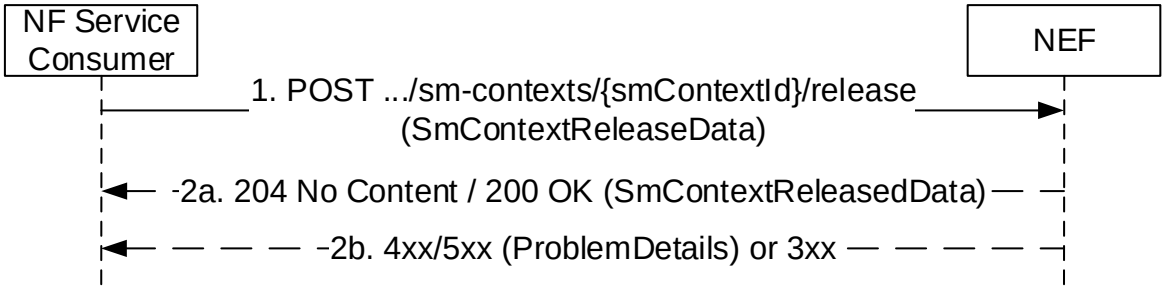

Figure 5.2.2.3.1-1: Delete Service Operation

1. The NF Service Consumer shall send a HTTP POST request towards the URI of "release" custom operation on the Individual SM Context resource received from the "Location" header during a successful Create service operation invocation (See clause 5.2.2.2). The request body shall contain a "SmContextReleaseData" object.

2a. On success, "204 No Content" shall be returned if no information is to be returned to the NF service consumer; otherwise "200 OK" shall be returned with a "SmContextReleasedData" object in response body including necessary information to the NF service consumer, e.g.:

   - Small Data Rate Control status, if Small Data Rate Control is enforced;

   - APN Rate Status, if APN Rate Control is enforced

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.4.2-2 shall be returned, the response body should contain a "ProblemDetails" object with "cause" attribute set to one of the application errors listed in Table 6.1.3.3.4.2.2-2.

5.2.2.4 Status Notify Service Operation

5.2.2.4.1 General

The Status Notify service operation is used during the following procedure:

- NEF Initiated SMF-NEF Connection Release procedure (see 3GPP TS 23.502 [3], clause 4.25.8)

The Status Notify service operation is invoked by the NEF to inform a NF Service Consumer (e.g. a SMF), when the status of the Individual SM Context has changed.

The NEF shall inform the status change of the Individual SM Context resource by sending the HTTP POST method towards the Notification URI as shown in Figure 5.2.2.4.1-1.

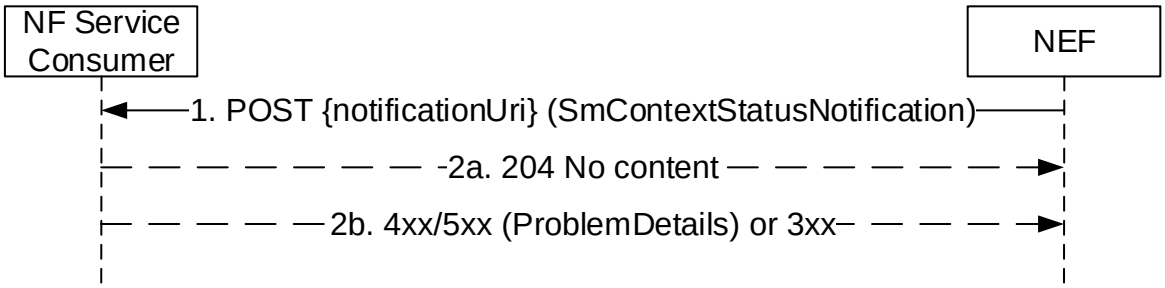

Figure 5.2.2.4.1-1: Status Notify Service Operation

1. The NEF shall send a POST request towards the Notification URI received in the Create service operation request (See clause 5.2.2.2). The request body shall contain a "SmContextStatusNotification" object indicating the changed status of the Individual SM Context resource. The "smContextId" attribute shall contain the URI of the SM Context resource that triggers the notification.

2a. On success, "204 No content" shall be returned without response body.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.5.2.3.1-2 shall be returned, the response body should contain a "ProblemDetails" object.

5.2.2.4.2 Notify of Individual SM Context Release (Nnef_SMContext_DeleteNotify)

During NEF initiated SMF-NEF connection release procedure (see 3GPP TS 23.502 [3], clause 4.25.8), the NEF shall send Status Notification to inform the NF service consumer that the Individual SM Context is released.

The requirements in clause 5.2.2.4.1 shall be applied, with following additions:

1. Same as step 1 of Figure 5.2.2.4.1-1, the NEF shall set the value of "status" attribute in the request body to "RELEASED".

   - If Small Data Rate Control is enforced, the response body should include the Small Data Rate Control status.

   - If APN Rate Control is enforced, the response body should include the APN Rate Status.

5.2.2.5 Update Service Operation

5.2.2.5.1 General

The Update service operation is invoked by a NF Service Consumer, e.g. a SMF, towards the NEF, when the SMF detects that some of the configurations of the PDU session has changed and the related SM Context for NIDD needs to be updated accordingly.

The NF Service Consumer (e.g. the SMF) shall update the SM Context for NIDD on NEF by invoking the "update" custom operation of the Individual SM Context resource as shown in Figure 5.2.2.5.1-1.

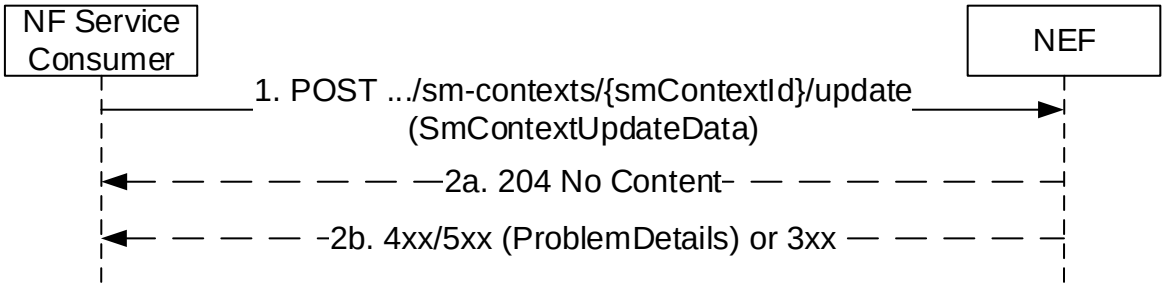

Figure 5.2.2.5.1-1: Update Service Operation

1. The NF Service Consumer shall send a POST request to the URI of "update" custom operation on an Individual SM Context resource, with a "SmContextUpdateData" object in request body containing the attributes to be updated, e.g.:

   - URI of the resource to receive downlink data delivery for NIDD;

   - Notification URI to receive the SM Context notifications;

   - modified configuration parameters, e.g. serving PLMN rate control, small data rate control, etc.

NOTE: If both the NEF and the NF service consumer (i.e. the SMF) supports "BIUMR" feature, the SMF can include the updated binding indication(s) for multiple PDU session resources (for NIDD downlink data delivery) and/or notification URIs (for SM Context notifications), as specified in clauses 6.12.1 and 5.2.3.2.6 of 3GPP TS 29.500 [4].

2a. On success, "204 No Content" shall be 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, the response body should contain a ProblemDetails object with "cause" attribute set to one of the application errors listed in Table 6.1.3.3.4.3.2-2.

5.2.2.6 Deliver Service Operation

5.2.2.6.1 General

The Deliver service operation is invoked by a NF Service Consumer, e.g. a SMF, to transport Mobile Originated data packet via NEF.

The NF Service Consumer (e.g. the SMF) shall deliver Mobile Originate data via NEF by invoking the "deliver" custom operation of the Individual SM Context resource as shown in Figure 5.2.2.6.1-1.

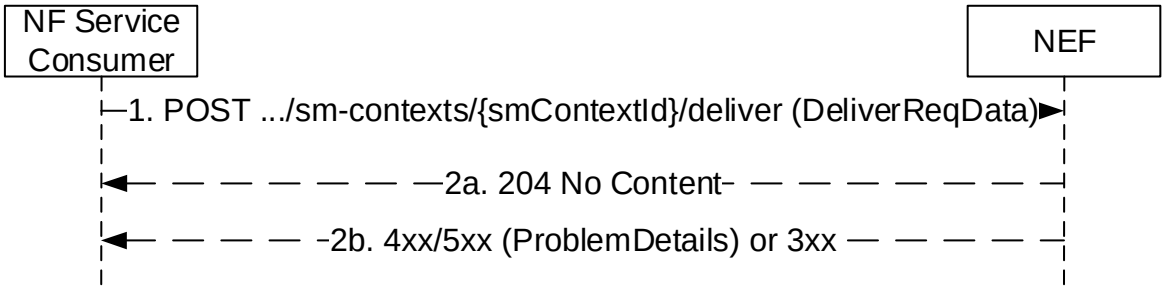

Figure 5.2.2.5.6-1: Deliver Service Operation

1. The NF Service Consumer shall send a POST request to the URI of "deliver" custom operation on an Individual SM Context resource, with the request body containing:

   - the MO data as binary body part with content type set as "application/octet-stream"; and

   - a "DeliverReqData" object as another body part with "data" attribute refer to the MO data binary part.

2a. On success, "204 No Content" shall be returned.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.4.4.2-2 shall be returned. The response body should contain a ProblemDetails object with "cause" attribute set to one of the application errors listed in Table 6.1.3.3.4.4.2-2.

5.3 Nnef_SMService Service

5.3.1 Service Description

See 3GPP TS 23.540 [18] clause 6.8.1

5.3.2.2 MoForwardSm

5.3.2.2.1 General

The MoForwardSm service operation shall be used to transmit MO SMS message via NEF.

It is used in the following procedures:

- MSISDN-less MO SMS message transfer (see clause 5.2.4 of 3GPP TS 23.540 [18]).

The NF Service Consumer (e.g. SMS-SC) shall transmit MO SMS message to NEF by using the HTTP POST method as shown in Figure 5.3.2.2.1-1.

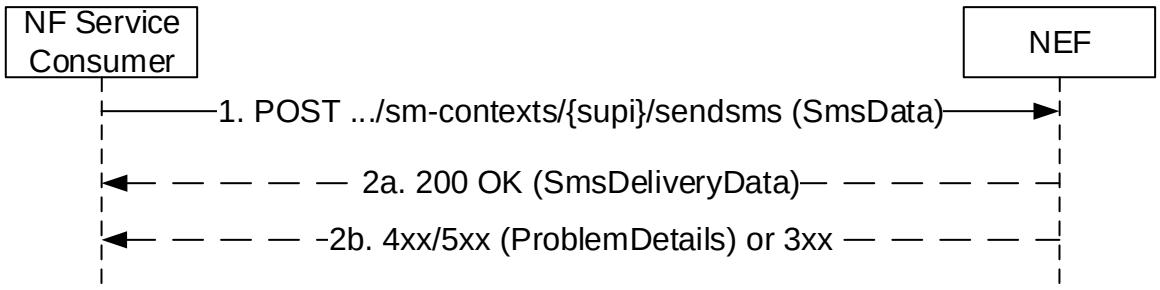

Figure 5.3.2.2.1-1: SBI-based MO SM transfer

1. The NF Service Consumer shall send a POST request to the resource representing the UE's Mobile Originated Short Message Information resource (i.e. …/sm-contexts/{supi}/sendsms) of the NEF. The payload body of the POST request shall contain the SMS message to be sent.

2a. On success, "200 OK" shall be returned with "SmsDeliveryData" object contains the MO SMS Delivery Report in the response body.

2b. On failure, or redirection, one of the HTTP status code listed in Table 6.2.3.2.4.2.2-2 shall be returned.

6 API Definitions

6.1 Nnef_SMContext Service API

6.1.1 Introduction

The Nnef_SMContext service shall use the Nnef_SMContext service API.

The request URI used in HTTP request from the NF service consumer towards the NF service producer 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 "nnef-smcontext".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2, IETF RFC 7540 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

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

The OpenAPI [6] specification of HTTP messages and content bodies for the Nnef_SMContext API is contained in Annex A.

6.1.2.2 HTTP standard headers

6.1.2.2.1 General

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

6.1.2.2.2 Content type

JSON, IETF RFC 8259 [12], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

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

6.1.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be applicable. In this release of the specification, no specific custom headers are defined for the Nnef_SMContext service.

6.1.3 Resources

6.1.3.1 Overview

Figure 6.1.3.1-1 describes the resource URI structure of the Nnef_SMContext API.

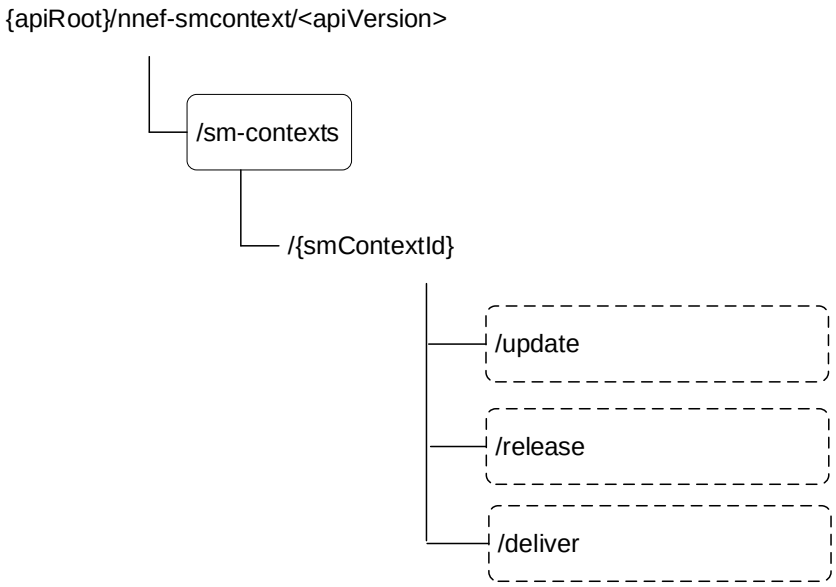

Figure 6.1.3.1-1: Resource URI structure of the Nnef_SMContext API

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
SM Contexts Collection	{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts	POST	Creates an Individual SM Context resource.
Individual SM Context	{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts/{smContextId}/release	release (POST)	Deletes an Individual SM Context resource.
	{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts/{smContextId}/update	update (POST)	Updates an Individual SM Context resource.
	{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts/{smContextId}/deliver	deliver (POST)	Delivers Mobile Originated data packet.

6.1.3.2 Resource: SM Contexts Collection

6.1.3.2.1 Description

This resource represents the collection of the Individual SM Context resources created in the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [5]).

6.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts**

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 clause 6.1.1
apiVersion	See clause 6.1.1

6.1.3.2.3 Resource Standard Methods

6.1.3.2.3.1 POST

This method creates an Individual SM Context resource in the SM Context Collection.

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	Applicability
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
SmContextCreateData	M	1	Representation of the Individual SM context to be created.

Table 6.1.3.2.3.1-3: Data structures supported by the <method 1> Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SmContextCreatedData	M	1	201 Created	Successful creation of an Individual SM context.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
ProblemDetails	O	1	403 Forbidden	The "cause" attribute may be used to indicate the following application errors: - USER_UNKNOWN - NIDD_CONFIGURATION_NOT_AVAILABLE See table 6.1.7.3-1 for the description of these errors.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with response body containing an object of ProblemDetails data type (see clause 5.2.7 of 3GPP TS 29.500 [4]).				

Table 6.1.3.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

Table 6.1.3.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

6.1.3.2.4 Resource Custom Operations

None.

6.1.3.3 Resource: Individual SM Context

6.1.3.3.1 Description

This resource represents an Individual SM Context resource in the NEF.

This resource is modelled with the Document resource archetype (see clause C.2 of 3GPP TS 29.501 [5]).

6.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts/{smContextId}**

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 clause 6.1.1
apiVersion	See clause 6.1.1
smContextId	SM context identifier assigned by the NEF during the Create service operation.

6.1.3.3.3 Resource Standard Methods

There is no standard HTTP method supported by this resource.

6.1.3.3.4 Resource Custom Operations

6.1.3.3.4.1 Overview

This resource supports custom operation(s) as specified in table 6.1.3.3.4.1-1.

Table 6.1.3.3.4.1-1: Custom operations

Custom operaration URI	Mapped HTTP method	Description
{resourceUri}/release	POST	Delete service operation.
{resourceUri}/update	POST	Update service operation.
{resourceUri}/deliver	POST	Deliver service operation

6.1.3.3.4.2 Operation: release

6.1.3.3.4.2.1 Description

This custom operation releases an Individual SM Context resource previously created in the NEF.

6.1.3.3.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 6.1.3.2.4.2.2-1 and the response data structure and response codes specified in table 6.1.3.2.4.2.2-2.

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
SmContextReleaseData	M	1	Representation of the information to release the Individual SM context.

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
SmContextReleasedData	M	1	200 OK	Successful release of an Individual SM context with information sent to the NF service consumer.
n/a			204 No Content	Successful release of an Individual SM context without information sent to the NF service consumer.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
ProblemDetails	O	1	404 Not Found	The "cause" attribute may be used to indicate the following application errors: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with response body containing an object of ProblemDetails data type (see clause 5.2.7 of 3GPP TS 29.500 [4]).				

Table 6.1.3.3.4.2.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

Table 6.1.3.3.4.2.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

6.1.3.3.4.3 Operation: update

6.1.3.3.4.3.1 Description

This custom operation updates an individual SM Context resource.

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 structure 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
SmContextUpdateData	M	1	Representation of the updates to apply to the Individual SM context.

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 update of the Individual SM context, when the NEF does not need to return information in the response.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
ProblemDetails	O	1	404 Not Found	The "cause" attribute may be used to indicate the following application errors: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with response body containing an object of ProblemDetails data type (see clause 5.2.7 of 3GPP TS 29.500 [4]).				

Table 6.1.3.3.4.3.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

Table 6.1.3.3.4.3.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

6.1.3.3.4.4 Operation: deliver

6.1.3.3.4.4.1 Description

This custom operation transports Mobile Originated data packet via NEF.

6.1.3.3.4.4.2 Operation Definition

This operation shall support the request data structures specified in table 6.1.3.3.4.4.2-1 and the response data structure and response codes specified in table 6.1.3.3.4.4.2-2.

Table 6.1.3.3.4.4.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DeliverReqData	M	1	The data for Deliver service request, including the Mobile Originated data to be delivered via NEF.

Table 6.1.3.3.4.4.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful delivery of Mobile Originate data via NEF.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
ProblemDetails	O	1	404 Not Found	The "cause" attribute may be used to indicate the following application errors: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with response body containing an object of ProblemDetails data type (see clause 5.2.7 of 3GPP TS 29.500 [4]).				

Table 6.1.3.3.4.4.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

Table 6.1.3.3.4.4.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

6.1.5 Notifications

6.1.5.1 General

This clause specifies the notifications provided by the Nnef_SMContext service.

Notifications shall comply to clause 6.2 of 3GPP TS 29.500 [4] and clause 4.6.2.3 of 3GPP TS 29.501 [5].

6.1.5.2 Status Notification

6.1.5.2.1 Description

If the NF Service Consumer (e.g. the SMF) has provided the Notification URI for getting notified about change of SM Context status, the NEF shall notify the NF Service Consumer when the SM Context status is updated.

6.1.5.2.2 Target URI

The Notification URI **"{notificationUri}"** 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
notificationUri	String formatted as URI with the Notification Uri

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
SmContextStatusNotification	M	1	Representation of the SM Context status notification.

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	Successful notification of the SM context status change
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The NF service consumer shall generate a Location header field containing a URI pointing to the endpoint of another NF service consumer to which the notification should be sent. If an SCP redirects the message to another SCP then the location header field shall contain the same URI or a different URI pointing to the endpoint of the NF service consumer to which the notification should be sent.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The NF service consumer shall generate a Location header field containing a URI pointing to the endpoint of another NF service consumer to which the notification should be sent. If an SCP redirects the message to another SCP then the location header field shall contain the same URI or a different URI pointing to the endpoint of the NF service consumer to which the notification should be sent.
NOTE: 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, with response body containing an object of ProblemDetails data type (see clause 5.2.7 of 3GPP TS 29.500 [4]).				

Table 6.1.5.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	A URI pointing to the endpoint of the NF service consumer to which the notification should be sent
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the notification is redirected

Table 6.1.5.2.3.1-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	A URI pointing to the endpoint of the NF service consumer to which the notification should be sent
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the notification is redirected

6.1.6 Data Model

6.1.6.1 General

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

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

Table 6.1.6.1-1: Nnef_SMContext specific Data Types

Data type	Clause defined	Description	Applicability
SmContextCreateData	6.1.6.2.2	Information within Create SM Context Request	
SmContextCreatedData	6.1.6.2.3	Information within Create SM Context Response	
SmContextReleaseData	6.1.6.2.4		
SmContextReleasedData	6.1.6.2.5		
SmContextStatusNotification	6.1.6.2.6	Information within Notify SM Context Status Request	
NiddInformation	6.1.6.2.7	NIDD information associated to the SM Context	
SmContextConfiguration	6.1.6.2.8	NIDD related configurations that should be applied for the SM Context on NEF	
SmallDataRateControl	6.1.6.2.9	Data rate control information	
SmContextUpdateData	6.1.6.2.10	Information within Update SM Context Request	
DeliverReqData	6.1.6.2.11	Information within Deliver Service Operation Request	
SmContextStatus	6.1.6.3.3	Enumeration of the status for an Individual SM Context	
SmallDataRateControlTimeUnit	6.1.6.3.4	Enumeration of the time units that are applied to data rate control	
ReleaseCause	6.1.6.3.5	Enumeration of causes for SM Context release	

Table 6.1.6.1-2 specifies data types re-used by the Nnef_SMContext 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 $N_{<NF>}$ service based interface.

Table 6.1.6.1-2: Nnef_SMContext re-used Data Types

Data type	Reference	Comments	Applicability
Uri	3GPP TS 29.571 [14]	Uniform Resource Identifier	
Supi	3GPP TS 29.571 [14]	Subscription Permanent Identifier	
Gpsi	3GPP TS 29.571 [14]	General Public Subscription Identifier	
SupportedFeatures	3GPP TS 29.571 [14]	Supported features	
PduSessionId	3GPP TS 29.571 [14]	PDU Session Identifier	
Dnn	3GPP TS 29.571 [14]	Data Network Name	
Snssai	3GPP TS 29.571 [14]	Single Network Slice Selection Assistance Information	
ProblemDetails	3GPP TS 29.571 [14]	Error description	
SmallDataRateStatus	3GPP TS 29.571 [14]	Small Data Rate Control Status	
ExternalGroupId	3GPP TS 29.571 [14]	External Group Identifier	
RefToBinaryData	3GPP TS 29.571 [14]	Reference to binary data part	
RedirectResponse	3GPP TS 29.571 [14]	Redirect Response	

6.1.6.2 Structured data types

6.1.6.2.1 Introduction

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

6.1.6.2.2 Type: SmContextCreateData

Table 6.1.6.2.2-1: Definition of type SmContextCreateData

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	M	1	This IE shall contain the subscriber permanent identify of the UE.	
pduSessionId	PduSessionId	M	1	This IE shall contain the PDU Session ID indicating the PDU session associated with the SM Context for NIDD to be created.	
dnn	Dnn	M	1	This IE shall contain the requested DNN.	
snssai	Snssai	M	1	This IE shall contain the requested S-NSSAI for the home PLMN.	
nefId	string	M	1	This IE shall contain the NEF ID of the target NEF (see clause 6.1.6.2.48 of 3GPP TS 29.510 [10]).	
dlNiddEndPoint	Uri	M	1	This IE shall contain the URI of the Individual PDU session resource (see clause 6.1.3.2 of 3GPP TS 29.542 [17]) provided by the NF service consumer to handle downlink NIDD data delivery.	
notificationUri	Uri	M	1	This IE shall contain the URI to receive SM Context Status Notifications sent by the NEF.	
niddInfo	NiddInformation	O	0..1	When present, this IE shall contain the information used for the SM Context.	
rdsSupport	boolean	O	0..1	When present, this IE shall indicate the UE capability to support RDS. The value of this IE shall be set as following: - true: UE supports RDS - false (default): UE does not support RDS	
smContextConfig	SmContextConfiguration	O	0..1	When present, this IE shall contain the configuration for the NIDD.	
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported.	

6.1.6.2.3 Type: SmContextCreatedData

Table 6.1.6.2.3-1: Definition of type SmContextCreatedData

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	M	1	This IE shall contain the subscriber permanent identify of the UE.	
pduSessionId	PduSessionId	M	1	This IE shall contain the PDU Session ID indicating the PDU session associated with the SM Context for NIDD to be created.	
dnn	Dnn	M	1	This IE shall contain the requested DNN.	
snssai	Snssai	M	1	This IE shall contain the requested S-NSSAI for the home PLMN.	
nefId	string	M	1	This IE shall contain the NEF ID of the target NEF (see clause 6.1.6.2.48 of 3GPP TS 29.510 [10]).	
rdsSupport	boolean	O	0..1	When present, this IE shall indicate the NEF capability to support RDS. The value of this IE shall be set as following: - true: NEF supports RDS - false (default): NEF does not support RDS	
extBufSupport	boolean	O	0..1	When present, this IE shall indicate whether Extended Buffering applies or not. The value of this IE shall be set as following: - true: Extended Buffering applies - false (default): Extended Buffering does not apply	
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported.	
maxPacketSize	integer	O	0..1	Maximum Packet Size in bytes for NIDD data packet. When received from the NEF, SMF shall inform the UE of the Maximum Packet Size in the PCO in the PDU Session Establishment Accept message.	

6.1.6.2.4 Type: SmContextReleaseData

Table 6.1.6.2.4-1: Definition of type SmContextReleaseData

Attribute name	Data type	P	Cardinality	Description	Applicability
cause	ReleaseCause	M	1	The cause to release the SM Context	

6.1.6.2.5 Type: SmContextReleasedData

Table 6.1.6.2.5-1: Definition of type SmContextReleasedData

Attribute name	Data type	P	Cardinality	Description	Applicability
smallDataRateStatus	SmallDataRateStatus	C	0..1	This IE shall be present if the Small Data Rate Control is enabled for the SM Context. When present, this IE shall contain the Small Data Rate Control Status, as specified in clause 5.31.14.3 of 3GPP TS 23.501 [2].	
apnRateStatus	ApnRateStatus	C	0..1	This IE shall be present if the APN Rate Control is enabled for the SM Context. When present, this IE shall contain the APN Rate Status, as specified in clause 5.4.4.40 of 3GPP TS 29.571 [14].	

6.1.6.2.6 Type: SmContextStatusNotification

Table 6.1.6.2.6-1: Definition of type SmContextStatusNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
status	SmContextStatus	M	1	This IE shall contain the current status of the SM Context	
smContextId	Uri	M	1	This IE shall contain the URI of the SM Context resource that triggers the notification.	
cause	ReleaseCause	M	1	The cause to release the SM Context	
smallDataRateStatus	SmallDataRateStatus	C	0..1	This IE shall be present if the SM Context is released and Small Data Rate Control is enabled for the SM Context. When present, this IE shall contain the Small Data Rate Control Status, as specified in clause 5.31.14.3 of 3GPP TS 23.501 [2].	
apnRateStatus	ApnRateStatus	C	0..1	This IE shall be present if the APN Rate Control is enabled for the SM Context. When present, this IE shall contain the APN Rate Status, as specified in clause 5.4.4.40 of 3GPP TS 29.571 [14].	

6.1.6.2.7 Type: NiddInformation

Table 6.1.6.2.7-1: Definition of type NiddInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
extGroupId	ExternalGroupId	O	0..1	When present, this IE shall contain the External group Id of the UE.	
gpsi	Gpsi	O	0..1	When present, this IE shall contain the GPSI of the UE.	
afId	string	O	0..1	The string identifying the AF as the owner of associated NIDD Configuration, which is received from Nidd Information in UDM (See clause 6.1.6.2.35 of 3GPP TS 29.503 [16]).	
NOTE: At least one of the attributes in the table shall be present.					

6.1.6.2.8 Type: SmContextConfiguration

Table 6.1.6.2.8-1: Definition of type SmContextConfiguration

Attribute name	Data type	P	Cardinality	Description	Applicability
smalDataRateControl	SmallDataRateControl	O	0..1	When present, this IE shall contain the configured Small Data Rate Control for downlink data, as specified in clause 5.31.14.3 of 3GPP TS 23.501 [2].	
smallDataRateStatus	SmallDataRateStatus	C	0..1	This IE shall contain the Small Data Rate Status if the Small Data Rate Status is available (see clause 5.31.14.3 of 3GPP TS 23.501 [2]).	
servPlmnDataRateCtl	integer	O	0..1	When present, this IE shall contain the maximum allowed number of Downlink NAS Data PDUs per deci hour of the serving PLMN, as specified in clause 5.31.14.2 of 3GPP TS 23.501 [2]. In Update service operation, this IE may be set to null value indicating the Serving PLMN Rate Control is disabled. Minimum: 10	
NOTE: At least one of the attributes in the table shall be present.					

6.1.6.2.9 Type: SmallDataRateControl

Table 6.1.6.2.8-1: Definition of type SmallDataRateControl

Attribute name	Data type	P	Cardinality	Description	Applicability
timeUnit	SmallDataRateControlTimeUnit	M	1	This IE shall indicate the time unit for which the data rate control is applied.	
maxPacketRateUl	integer	O	0..1	If present, this IE shall indicate the maximum number of uplink packets allowed to be sent within the time unit. (NOTE 1)	
maxPacketRateDl	integer	O	0..1	If present, this IE shall indicate the maximum number of downlink packets allowed to be sent within the time unit. (NOTE 1)	
maxAdditionalPacketRateUl	integer	O	0..1	If present, this IE shall indicate the additional maximum number of uplink packets allowed to be sent within the time unit. (NOTE 2)	
maxAdditionalPacketRateDl	integer	O	0..1	If present, this IE shall indicate the additional maximum number of downlink packets allowed to be sent within the time unit. (NOTE 3)	
NOTE 1: At least one of parameters maxPacketRateUl, or maxPacketRateDl should be included. NOTE 2: Parameter maxAdditionalPacketRateUl should be absent if parameter maxPacketRateUl is absent. NOTE 3: Parameter maxAdditionalPacketRateDl should be absent if parameter maxPacketRateDl is absent.					

6.1.6.2.10 Type: SmContextUpdateData

Table 6.1.6.2.10-1: Definition of type SmContextUpdateData

Attribute name	Data type	P	Cardinality	Description	Applicability
dlNiddEndPoint	Uri	O	0..1	When present, this IE shall contain a new URI of Individual PDU session resource (see clause 6.1.3.2 of 3GPP TS 29.542 [17]) handling downlink NIDD data delivery. The NEF shall send downlink data to the resource identified by the new URI after the update is completed.	
notificationUri	Uri	O	0..1	When present, this IE shall contain a new URI to receive SM Context Status Notifications sent by the NEF. The NEF shall send SM Contact Status Notification to this new URI after the update is completed.	
smContextConfig	SmContextConfiguration	O	0..1	When present, this IE shall contain the configuration for the NIDD.	
NOTE: At least one of the attributes in the table shall be present.					

6.1.6.2.11 Type: DeliverReqData

Table 6.1.6.2.12-1: Definition of type DeliverReqData

Attribute name	Data type	P	Cardinality	Description
data	RefToBinaryData	M	1	This IE shall contain the reference to Mobile Originated data to be delivered via NEF.

6.1.6.3 Simple data types and enumerations

6.1.6.3.1 Introduction

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

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

6.1.6.3.3 Enumeration: SmContextStatus

The enumeration SmContextStatus represents status of Individual SM Context in the NEF. It shall comply with the provisions defined in table 6.1.5.3.3-1.

Table 6.1.6.3.3-1: Enumeration SmContextStatus

Enumeration value	Description	Applicability
"RELEASED"	Indicates that the Individual SM Context for NIDD is released.	

6.1.6.3.4 Enumeration: SmallDataRateControlTimeUnit

The enumeration SmallDataRateControlTimeUnit represents the allowed time unit. It shall comply with the provisions defined in table 6.1.5.3.3-1.

Table 6.1.6.3.4-1: Enumeration SmallDataRateControlTimeUnit

Enumeration value	Description	Applicability
"MINUTE"	Indicates the rate control is applied per minute.	
"HOUR"	Indicates the rate control is applied per hour.	
"DAY"	Indicates the rate control is applied per day.	
"WEEK"	Indicates the rate control is applied per week.	
"6MINUTES"	Indicates the rate control is applied per 6 minutes.	

6.1.6.3.5 Enumeration: ReleaseCause

The enumeration ReleaseCause represents cause for release of the SM Context in the NEF. It shall comply with the provisions defined in table 6.1.6.3.5-1.

Table 6.1.6.3.5-1: Enumeration ReleaseCause

Enumeration value	Description	Applicability
"PDU_SESSION_RELEASED"	Indicates the SM Context is to be released due to corresponding PDU Session is released.	

6.1.7 Error Handling

6.1.7.1 General

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

In addition, the requirements in the following clauses are applicable for the Nnef_SMContext API.

6.1.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [4]. No specific procedures for the Nnef_SMContext service are specified.

6.1.7.3 Application Errors

The application errors defined for the Nnef_SMContext service are listed in Table 6.1.7.3-1.

Table 6.1.7.3-1: Application errors

Application Error	HTTP status code	Description
"USER_UNKNOWN"	403	This application error indicates that the User Identity does not exist in the NEF.
"NIDD_CONFIGURATION_NOT_AVAILABLE"	403	This application error indicates that there is no valid NIDD configuration exists for the requested SM Context in the NEF, and NIDD configuration triggered by the NEF (see clause 4.4.12.2 of 3GPP TS 29.522 [15]) is not supported or has failed.
"CONTEXT_NOT_FOUND"	404	This application error indicates that the SM Context referred by the requested resource URI does not exist in the NEF.

6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Nnef_SMContext API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.1.8-1: Supported Features

Feature number	Feature Name	Description
1	BIUMR	Binding Indication Update for Multiple Resources This feature bit indicates whether the NF Service Consumer (i.e. SMF) and NEF supports Binding Indication Update for multiple resources and/or contexts, as specified in clauses 6.12.1 and 5.2.3.2.6 of 3GPP TS 29.500 [4].

6.1.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Nnef_SMContext API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [9]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [10]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Nnef_SMContext API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], 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 Nnef_SMContext service.

The Nnef_SMContext API defines a single scope "nnef-smcontext" for the entire service, and it does not define any additional scopes at resource or operation level.

6.1.10 HTTP redirection

An HTTP request may be redirected to a different NEF service instance, within the same NEF or a different NEF of an NEF set, e.g. when an NEF service instance is part of an NEF (service) set or when using indirect communications (see 3GPP TS 29.500 [4]).

An SCP that reselects a different NEF producer instance will return the NF Instance ID of the new NEF producer instance in the 3gpp-Sbi-Producer-Id header, as specified in clause 6.10.3.4 of 3GPP TS 29.500 [4].

If an NEF within an NEF set redirects a service request to a different NEF of the set using an 307 Temporary Redirect or 308 Permanent Redirect status code, the identity of the new NEF towards which the service request is redirected shall be indicated in the 3gpp-Sbi-Target-Nf-Id header of the 307 Temporary Redirect or 308 Permanent Redirect response as specified in clause 6.10.9.1 of 3GPP TS 29.500 [4].

6.2 Nnef_SMService Service API

6.2.1 Introduction

The Nnef_SMService shall use the Nnef_SMService API.

The API URI of the Nnef_SMService API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI 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 "nnef-smservice".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

6.2.2 Usage of HTTP

6.2.2.1 General

HTTP/2, IETF RFC 7540 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

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

The OpenAPI [6] specification of HTTP messages and content bodies for the Nnef_SMService API is contained in Annex A.

6.2.2.2 HTTP standard headers

6.2.2.2.1 General

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

6.2.2.2.2 Content type

JSON, IETF RFC 8259 [12], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

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

Multipart messages shall also be supported (see clause 6.1.2.4) using the content type "multipart/related", comprising:

- one JSON body part with the "application/json" content type; and
- one binary body part with 3gpp vendor specific content subtypes.

The 3gpp vendor specific content subtypes defined in Table 6.2.2.2.2-1 shall be supported.

Table 6.2.2.2.2-1: 3GPP vendor specific content subtypes

content subtype	Description
vnd.3gpp.sms	Binary encoded payload, encoding SMS payload, as specified in 3GPP TS 23.040 [20] and 3GPP TS 24.011 [21].
NOTE: Using 3GPP vendor content subtypes allows to describe the nature of the opaque payload (e.g. SMS payload) without having to rely on metadata in the JSON payload.	

See clause 6.1.2.4 for the binary payloads supported in the binary body part of multipart messages.

6.2.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4] may be supported.

6.2.2.4 HTTP multipart messages

HTTP multipart messages shall be supported, to transfer opaque SMS payload (e.g. SMS message, CP Ack, etc.), in the following service operations (and HTTP messages):

- MoForwardSm service operation;

HTTP multipart messages shall include one JSON body part and one binary body part comprising content of SMS payload content (see clause 6.1.6.5).

The JSON body part shall be the "root" body part of the multipart message. It shall be encoded as the first body part of the multipart message. The "Start" parameter does not need to be included.

The multipart message shall include a "type" parameter (see IETF RFC 2387 [18]) specifying the media type of the root body part, i.e. "application/json".

NOTE: The "root" body part (or "root" object) is the first body part the application processes when receiving a multipart/related message, see IETF RFC 2387 [18]. The default root is the first body within the multipart/related message. The "Start" parameter indicates the root body part, e.g. when this is not the first body part in the message.

A binary body part shall include a Content-ID header (see IETF RFC 2045 [19]), and the JSON body part shall make a reference to the binary body part using the Content-ID header field.

Examples of multipart/related messages can be found in Annex B.

6.2.3 Resources

6.2.3.1 Overview

Figure 6.2.3.1-1 describes the resource URI structure of the Nnef_SMService API.

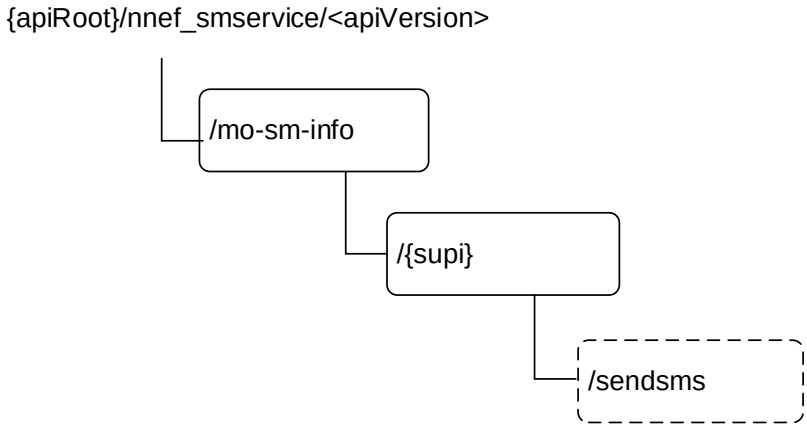

Figure 6.2.3.1-1: Resource URI structure of the Nnef_SMService API

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
MoSmInfo	{apiRoot}/nnef-smservice/<apiVersion>/mo-sm-info/{supi}/sendsms	sendsms (POST)	MO short message transfer

6.2.3.2 Resource: MoSmInfo

6.2.3.2.1 Description

This resource represents the collection of Mobile Originated Short Message Information in NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [5]).

6.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nnef-smcontext/<apiVersion>/sm-contexts/{supi}/sendsms**

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	Data type	Definition
apiRoot	string	See clause 6.1.1
supi	Supi	Represents the Subscription Permanent Identifier (see 3GPP TS 23.501 [2] clause 5.9.2) pattern: See pattern of type Supi in 3GPP TS 29.571 [15]

6.2.3.2.3 Resource Standard Methods

No HTTP method has been defined for the Mobile Originated Short Message Information collection resource.

6.2.3.2.4 Resource Custom Operations

6.2.3.2.4.1 Overview

Table 6.2.3.2.4.1-1: Custom operations

Operation name	Custom operaration URI	Mapped HTTP method	Description
sendsms	/sm-contexts/{supi}/sendsms	POST	Send MO SMS message or the related Delivery Report.

6.2.3.2.4.2 Operation: sendsms

6.2.3.2.4.2.1 Description

This custom operation is used for NF Service Consumers to send SMS message in uplink direction.

6.2.3.2.4.2.2 Operation Definition

This custom operation is used to send a SMS payload to an UE's Mobile Originated Short Message Information resource in the NEF.

This operation shall support the request data structures specified in table 6.2.3.2.4.2.2-1 and the response data structure and response codes specified in table 6.2.3.2.4.2.2-2.

Table 6.2.3.2.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SmsData	M	1	Representation of the MO SMS message to be sent.

Table 6.2.3.2.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SmsDeliveryData	M	1	200 OK	This case represents the successful of sending SMS message in uplink direction, with necessary response data on the received delivery report.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing a different URI, or the same URI if a request is redirected to the same target resource via a different SCP. In the former case, the URI shall be an alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set.
ProblemDetails	O	0..1	400 Bad Request	This case represents an unsuccessful delivery of SMS message. The "cause" attribute may be used to indicate one of the following application errors: - SMS_PAYLOAD_MISSING, if the expected SMS payload content is missing; - SMS_PAYLOAD_ERROR, if error exists in the SMS payload content.
ProblemDetails	O	0..1	403 Forbidden	This case represents an unsuccessful delivery of SMS message. The "cause" attribute may be used to indicate one of the following application errors: - UNKNOWN_SERVICE_CENTRE_ADDRESS, if the SMS-SC was unknown; - SERVICE_CENTRE_CONGESTION, if the SMS-SC was in congestion; - USER_NOT_SERVICE_CENTER, if the user didn't belongs to the SMS-SC; - FACILITY_NOT_SUPPORTED, if the facility not supported; - INVALID_SME_ADDRESS, if the SME address is invalid..
ProblemDetails	O	0..1	504 Gateway Timeout	This case represents an unsuccessful delivery of SMS message. The "cause" attribute may be used to indicate one of the following application errors: - UNREACHABLE_SMS_SC, if the response is timeout.
NOTE: The manadatory HTTP error status code for the <e.g. POST> method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				

Table 6.2.3.2.4.2.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

Table 6.2.3.2.4.2.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF or NEF (service) set. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance ID towards which the request is redirected

6.2.4 Custom Operations without associated resources

In this release of this specification, no custom operations without associated resources are defined.

6.2.5 Notifications

In this release of this specification, no notification procedures are defined.

6.2.6 Data Model

6.2.6.1 General

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

Table 6.2.6.1-1 specifies the data types defined for the Nnef_SMService service based interface protocol.

Table 6.2.6.1-1: Nnef_SMService specific Data Types

Data type	Clause defined	Description	Applicability
N/A			

Table 6.2.6.1-2 specifies data types re-used by the Nnef_SMContext 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 $N_{<NF>}$ service based interface.

Table 6.1.6.1-2: Nnef_SMService re-used Data Types

Data type	Reference	Comments	Applicability
ProblemDetails	3GPP TS 29.571 [15]	Common Data Type used in response bodies	
RedirectResponse	3GPP TS 29.571 [15]	Redirect Response	
Supi	3GPP TS 29.571 [15]	Subscription Permanent Identifier	
RefToBinaryData	3GPP TS 29.571 [15]	Information for indicating the binary content of SMS payload.	
SupportedFeatures	3GPP TS 29.571 [15]	Supported Features	
SmsData	3GPP TS 29.577 [19]	Information within request message invoking MoForwardSm service operation, for delivering MO SMS.	
SmsDeliveryData	3GPP TS 29.577 [19]	Information within response message invoking MoForwardSm service operation, for delivering MO SMS Delivery Report.	
AppPortId	3GPP TS 29.503 [16]	Application Port Id	

6.2.6.2 Structured data types

In this release of this specification, no structure to be used in resource representations is defined.

6.2.6.3 Simple data types and enumerations

6.2.6.3.1 Introduction

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

6.2.6.3.2 Simple data types

The simple data types defined in table 6.2.6.3.2-1 shall be supported.

Table 6.2.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
N/A			

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

None.

6.2.6.5 Binary data

6.1.6.5.1 Binary Data Types

Table 6.2.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
SMS Payload Information	6.2.6.5.2	vnd.3gpp.sms

6.2.6.5.2 SMS Payload Information

SMS Payload Information shall encode a SMS payload as specified in 3GPP TS 23.040 [20] and 3GPP TS 24.011 [21], using the vnd.3gpp.sms content-type.

SMS Payload Information may encode e.g. the following content:

- CP-DATA, CP-ACK, CP-ERROR as specified in 3GPP TS 23.040 [20] and 3GPP TS 24.011 [21].

6.2.7 Error Handling

6.2.7.1 General

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

In addition, the requirements in the following clauses are applicable for the Nnef_SMService API.

6.2.7.2 Protocol Errors

No specific procedures for the Nnef_SMService service are specified.

6.2.7.3 Application Errors

The application errors defined for the Nnef_SMService service are listed in Table 6.2.7.3-1.

Table 6.2.7.3-1: Application errors

Application Error	HTTP status code	Description
SMS_PAYLOAD_MISSING	400 Bad Request	The expected SMS payload content is missing.
SMS_PAYLOAD_ERROR	400 Bad Request	Errors exist in the format of SMS payload.
SERVICE_CENTRE_CONGESTION	403 Forbidden	The delivery of the MO short message failed because SMS-SC was in congestion.
USER_NOT_SERVICE_CENTER	403 Forbidden	The delivery of the short message failed because the user didn't belongs to the SMS-SC.
FACILITY_NOT_SUPPORTED	403 Forbidden	The delivery of the MO short message failed because of facility not supported.
INVALID_SME_ADDRESS	403 Forbidden	The delivery of the MO short message failed because the SME address is invalid.
UNREACHABLE_SMS_SC	504 Gateway Timeout	The delivery of the MO short message failed because the response is timeout.

6.2.8 Feature negotiation

The optional features in table 6.2.8-1 are defined for the Nnef_SMService API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.2.8-1: Supported Features

Feature number	Feature Name	Description
N/A		

6.2.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Nnef_SMService API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [9]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [10]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Nnef_SMService API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], 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 Nnef_SMService service.

The Nnef_SMService API defines a single scope "nnef-smservice" for the entire service, and it does not define any additional scopes at resource or operation level.

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the Nnef_SMContext API. It consists of OpenAPI 3.0.0 specifications in YAML format.

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: 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 3GPP Technical Specification are available on a Git-based repository, that uses the GitLab software version control system (see 3GPP TS 29.501 [5] clause 5.3.1 and 3GPP TR 21.900 [7] clause 5B).

A.2 Nnef_SMContext API

```
openapi: 3.0.0

info:
  title: Nnef_SMContext
  version: 1.1.0
  description: |
    Nnef SMContext Service.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.541 V17.3.0; 5G System; Session Management Services for Non-IP Data
Delivery (NIDD).
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.541/

servers:
  - url: '{apiRoot}/nnef-smcontext/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials:
    - nnef-smcontext

paths:
  /sm-contexts:
    post:
      summary: Create SM Context
      operationId: Create
      tags:
        - SM Contexts Collection (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SmContextCreateData'
      responses:
        '201':
          description: Success
          content:
            application/json:
              schema:
```

```
              $ref: '#/components/schemas/SmContextCreatedData'
          headers:
            Location:
              description: >
                'Contains the URI of the newly created Individual SM Context resource, according to
the structure:
                {apiRoot}/nnef-smcontext/<version>/sm-contexts/{smContextId}'
              required: true
              schema:
                type: string
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      callbacks:
        StatusNotify:
          '{$request.body#/notificationUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SmContextStatusNotification'
              responses:
                '204':
                  description: No Content, Notification was succesfull
                '307':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                '411':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /sm-contexts/{smContextId}/release:
    post:
      summary: Delete SM Context
      operationId: Delete
      tags:
        - Individual SM Context (Document)
      parameters:
        - name: smContextId
          in: path
          description: SM Context Resource ID
          required: true
          schema:
```

```
          type: string
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SmContextReleaseData'
    responses:
      '200':
        description: OK. Resource representation is returned
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SmContextReleasedData'
      '204':
        description: No Content.
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29571_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /sm-contexts/{smContextId}/update:
    post:
      summary: Update SM Context
      operationId: Update
      tags:
        - Individual SM Context (Document)
      parameters:
        - name: smContextId
          in: path
          description: SM Context Resource ID
          required: true
          schema:
            type: string
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SmContextUpdateData'
      responses:
        '204':
          description: No Content.
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29571_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /sm-contexts/{smContextId}/deliver:
    post:
```

```
      summary: Deliver Uplink MO Data
      operationId: Deliver
      tags:
        - Individual SM Context (Document)
      parameters:
        - name: smContextId
          in: path
          description: SM Context Resource ID
          required: true
          schema:
            type: string
      requestBody:
        required: true
        content:
          multipart/related:  # message with binary body part(s)
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/DeliverReqData'
                binaryMoData:
                  type: string
                  format: binary
            encoding:
              jsonData:
                contentType:  application/json
              binaryMoData:
                contentType:  application/octet-stream
                headers:
                  Content-Id:
                    schema:
                      type: string
      responses:
        '204':
          description: No Content.
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29571_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nnef-smcontext: Access to the Nnef_SMContext API

  schemas:
#
#  Structured Data Types
#
    SmContextCreateData:
      description: Representation of the Individual SM context to be created.
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        pduSessionId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
```

```
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      nefId:
        type: string
        description: This IE shall contain the NEF ID of the target NEF.
      dlNiddEndPoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      notificationUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      niddInfo:
        $ref: '#/components/schemas/NiddInformation'
      rdsSupport:
        type: boolean
        description: |
          When present, this IE shall indicate the UE capability to support RDS.
          The value of this IE shall be set as following
           - true  UE supports RDS
           - false (default)  UE does not support RDS
      smContextConfig:
        $ref: '#/components/schemas/SmContextConfiguration'
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - supi
      - pduSessionId
      - dnn
      - snssai
      - nefId
      - dlNiddEndPoint
      - notificationUri

  SmContextCreatedData:
    description: Representation of an Individual SM context successfully created.
    type: object
    properties:
      supi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
      pduSessionId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
      dnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      nefId:
        type: string
        description: This IE shall contain the NEF ID of the target NEF.
      rdsSupport:
        type: boolean
        default: false
        description: |
          When present, this IE shall indicate the NEF capability to support RDS.
          The value of this IE shall be set as following
            - true  NEF supports RDS
            - false (default)  NEF does not support RDS
      extBufSupport:
        type: boolean
        default: false
        description: |
          When present, this IE shall indicate whether Extended Buffering applies or not.
          The value of this IE shall be set as following
            - true  Extended Buffering applies
            - false (default)  Extended Buffering does not apply
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      maxPacketSize:
        type: integer
    required:
      - supi
      - pduSessionId
      - dnn
      - snssai
      - nefId

  SmContextReleaseData:
    description: Representation of the information to release the Individual SM context.
    type: object
    properties:
      cause:
```

```
          $ref: '#/components/schemas/ReleaseCause'
      required:
        - cause

    SmContextReleasedData:
      description: Successful release of an Individual SM context with information sent to the NF
service consumer.
      type: object
      properties:
        smallDataRateStatus:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
        apnRateStatus:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'

    SmContextStatusNotification:
      description: Representation of the SM Context status notification.
      type: object
      properties:
        status:
          $ref: '#/components/schemas/SmContextStatus'
        smContextId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        cause:
          $ref: '#/components/schemas/ReleaseCause'
        smallDataRateStatus:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
        apnRateStatus:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
      required:
        - status
        - smContextId

    NiddInformation:
      description: Informaiton related to NIDD used for the SM Context.
      type: object
      properties:
        extGroupId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        afId:
          type: string
          description: When present, this IE shall contain the AF Id used for the SM Context.

    SmContextConfiguration:
      description: NIDD Configuration for the SM context.
      type: object
      properties:
        smalDataRateControl:
          $ref: '#/components/schemas/SmallDataRateControl'
        smallDataRateStatus:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
        servPlmnDataRateCtl:
          type: integer
          minimum: 10
          nullable: true
          description: >
            When present, this IE shall contain the maximum allowed number of
            Downlink NAS Data PDUs per deci hour of the serving PLMN, as specified
            in subclause 5.31.14.2 of 3GPP TS 23.501 [2].
              Minimum  10

    SmallDataRateControl:
      description: Configuration of Small Data Rate Control for the SM Context.
      type: object
      properties:
        timeUnit:
          $ref: '#/components/schemas/SmallDataRateControlTimeUnit'
        maxPacketRateUl:
          type: integer
        maxPacketRateDl:
          type: integer
        maxAdditionalPacketRateUl:
          type: integer
        maxAdditionalPacketRateDl:
          type: integer
      required:
        - timeUnit
```

```
    SmContextUpdateData:
      description: Representation of the updates to apply to the Individual SM context.
      type: object
      properties:
        dlNiddEndPoint:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        notificationUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        smContextConfig:
          $ref: '#/components/schemas/SmContextConfiguration'

    DeliverReqData:
      description: The data for Deliver service request, including the Mobile Originated data to be
delivered via NEF.
      type: object
      properties:
        data:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
      required:
        - data
#
#  Simple Data Types
#


#
#  Enumeration Data Types
#
    SmContextStatus:
      anyOf:
      - type: string
        enum:
          - RELEASED
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: |
        Possible values are
        - RELEASED: Indicates that the Individual SM Context for NIDD is released.

    SmallDataRateControlTimeUnit:
      anyOf:
      - type: string
        enum:
          - MINUTE
          - HOUR
          - DAY
          - WEEK
          - 6MINUTES
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: |
        Possible values are
        - MINUTE: Indicates the rate control is applied per minute.
        - HOUR: Indicates the rate control is applied per hour.
        - DAY: Indicates the rate control is applied per day.
        - WEEK: Indicates the rate control is applied per week.
        - 6MINUTES: Indicates the rate control is applied per 6 minutes.

    ReleaseCause:
      anyOf:
      - type: string
        enum:
          - PDU_SESSION_RELEASED
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: |
        The cause to release the SM Context. Possible values are
        - PDU_SESSION_RELEASED: Indicates that the Individual SM Context for NIDD is released.
```

A.3 Nnef_SMService API

```
openapi: 3.0.0

info:
  title: Nnef_SMService
  version: 1.0.0
  description: |
    Nnef SMService Service.
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    All rights reserved.

externalDocs:
  description: 3GPP TS 29.541 V17.4.0; 5G System; Session Management Services for Non-IP Data
Delivery (NIDD).
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.541/

servers:
  - url: '{apiRoot}/nnef-smservice/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials:
    - nnef-smservice

paths:
  /sm-contexts/{supi}/sendsms:
    post:
      summary: Send SMS payload for a given UE
      operationId: SendSMS
      tags:
        - Send MO SMS message and the delivery report
      parameters:
        - name: supi
          in: path
          required: true
          description: Subscription Permanent Identifier (SUPI)
          schema:
            type: string
      requestBody:
        content:
          multipart/related:  # message with a binary body part
            schema:
              type: object
              properties:
                jsonData:
                  $ref: 'TS29577_Nipsmgw_SMService.yaml#/components/schemas/SmsData'
                binaryPayload:
                  type: string
                  format: binary
            encoding:
              jsonData:
                contentType: application/json
              binaryPayload:
                contentType: application/vnd.3gpp.sms
                headers:
                  Content-Id:
                    schema:
                      type: string
        required: true
      responses:
        '200':
          description: sending delivery report
          content:
            multipart/related:  # message with a binary body part
              schema:
                type: object
                properties:
                  jsonData:
                    $ref: 'TS29577_Nipsmgw_SMService.yaml#/components/schemas/SmsDeliveryData'
```

```
                  binaryPayload:
                    type: string
                    format: binary
              encoding:
                jsonData:
                  contentType: application/json
                binaryPayload:
                  contentType: application/vnd.3gpp.sms
                  headers:
                    Content-Id:
                      schema:
                        type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/504'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nnef-smcontext: Access to the Nnef_SMContext API

# schemas:

# COMPLEX TYPES:



# SIMPLE TYPES:



# ENUMS:
```

Annex B (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2019-09	CT4#93	C4-193889				Initial Draft.	0.1.0
2019-10	CT4#94	C4-194527				Incorporated pCRs agreed on CT4#94, including: C4-194208, C4-194440, C4-194441, C4-194442, C4-194443.	0.2.0
2019-11	CT4#95	C4-195642				Incorporated pCRs agreed on CT4#95, including: C4-195283, C4-195284, C4-195295.	0.3.0
2019-12	CT#86	CP-193072				TS presented for information	1.0.0
2020-03	CT4#96-e	C4-201265				Incorporated pCRs agreed on CT4#96-e, including:.C4-200588, C4-200589, C4-200744, C4-200944, C4-200985, C4-201156.	1.1.0
2020-03	CT#87e	CP-200061				Presented for approval	2.0.0
2020-03	CT#87e					Approved at CT#87e	16.0.0
2020-06	CT#88e	CP-201046	0001	2	B	Add Extended Buffering	16.1.0
2020-06	CT#88e	CP-201071	0002		F	Storage of YAML files in ETSI Forge	16.1.0
2020-06	CT#88e	CP-201046	0003		F	Revert MO Exception Data Indication	16.1.0
2020-06	CT#88e	CP-201046	0004	1	F	Parameter supplement to Create Service	16.1.0
2020-06	CT#88e	CP-201046	0005	1	F	Parameter supplement to Delete Service	16.1.0
2020-06	CT#88e	CP-201046	0006	1	F	Parameter supplement to Status Notify Service	16.1.0
2020-06	CT#88e	CP-201046	0008	1	F	Miscellaneous Corrections	16.1.0
2020-06	CT#88e	CP-201073	0009		F	29.541 Rel-16 API version and External doc update	16.1.0
2020-12	CT#90e	CP-203032	0010		F	YAML files in 3GPP Forge	16.2.0
2021-03	CT#91e	CP-210037	0011	1	F	HTTP 3xx redirection	16.3.0
2021-03	CT#91e	CP-210078	0012		F	29.541 Rel-16 API version and External doc update	16.3.0
2021-06	CT#92e	CP-210055	0013	1	F	Resolving Warning in Nnef_SMContext API	17.0.0
2021-06	CT#92e	CP-210051	0014		F	OpenAPI Reference	17.0.0
2021-06	CT#92e	CP-210059	0016	1	F	Redirect Response	17.0.0
2021-06	CT#92e	CP-210050	0017		F	29.541 Rel-17 API version and External doc update	17.0.0
2021-09	CT#93e	CP-212060	0020	-	A	3xx description correction for SCP	17.1.0
2022-03	CT#95e	CP-220023	0023	-	B	Update Binding Indication for Multiple Resources	17.2.0
2022-06	CT#96	CP-221045	0026		F	Description Fields	17.3.0
2022-06	CT#96	CP-221051	0027		F	29.541 Rel-17 API version and External doc update	17.3.0
2022-09	CT#97	CP-222201	0028	1	B	Nnef_SMService_MoForwardSm service API	17.4.0
2022-09	CT#97	CP-222027	0029	1	B	Nnef_SMService_MoForwardSm service operation	17.4.0
2022-09	CT#97	CP-222027	0030	1	F	Update Reference Model	17.4.0

History

Document history		
V17.2.0	May 2022	Publication
V17.3.0	July 2022	Publication
V17.4.0	October 2022	Publication