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| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Core Network and Terminals;  5G System; Network Exposure (NE) function services for Non-IP Data Delivery (NIDD);  Stage 3  (Release 16) | |
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# Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

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

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

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

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

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 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[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".

# 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) via the Nnef service based southbound interface (see 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3]).

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

## 5.1 Introduction

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

Table 5.1-1 List of NEF Services for NIDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 |
| 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 |

## 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.

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.

# 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 |
|  |  |  |

### 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].

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: 1.0.2

description: |

Nnef SMContext Service.

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externalDocs:

description: 3GPP TS 29.541 V16.4.0; 5G System; Session Management Services for Non-IP Data Delivery (NIDD).

url: http://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:

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:

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:

type: object

properties:

cause:

$ref: '#/components/schemas/ReleaseCause'

required:

- cause

SmContextReleasedData:

type: object

properties:

smallDataRateStatus:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SmallDataRateStatus'

apnRateStatus:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/ApnRateStatus'

SmContextStatusNotification:

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:

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:

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:

type: object

properties:

timeUnit:

$ref: '#/components/schemas/SmallDataRateControlTimeUnit'

maxPacketRateUl:

type: integer

maxPacketRateDl:

type: integer

maxAdditionalPacketRateUl:

type: integer

maxAdditionalPacketRateDl:

type: integer

required:

- timeUnit

SmContextUpdateData:

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:

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.

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-210059 | 0016 | 1 | F | Redirect Response | 16.4.0 |
| 2021-06 | CT#92e | CP-210073 | 0018 | - | F | 29.541 Rel-16 API version and External doc update | 16.4.0 |
| 2021-09 | CT#93e | CP-212060 | 0019 | - | F | 3xx description correction for SCP | 16.5.0 |