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Contents

Foreword

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

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        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 high level data model for the Nudr Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the Unified Data Repository (UDR). The data model and usage of the subscription data is specified in 3GPP TS 29.505 [2], and the data model and usage of the policy data, structured data for exposure and application data are specified in 3GPP TS 29.519 [3].

The 5G System architecture is specified in 3GPP TS 23.501 [4]. The stage 2 definition and related procedures for Nudr SBI service are specified in 3GPP TS 23.502 [5] and 3GPP TS 23.503 [6].

The Technical Realization of the Service Based Architecture is specified in 3GPP TS 29.500 [7] and the Principles and Guidelines for Services Definition is specified in 3GPP TS 29.501 [8].

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 29.505: "5G System; Usage of the Unified Data Repository Services for Subscription Data; Stage 3".

[3]   3GPP TS 29.519: "5G System; Usage of the Unified Data Repository Service for Policy Data, Structured Data for Exposure and Application Data; Stage 3".

[4]   3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

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

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

[7]   3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[8]   3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[9]   IETF RFC 6901(April 2013): "JavaScript Object Notation (JSON) Pointer".

[10]   3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

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

[12]   3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[14]   3GPP TS 29.510: "Network Function Repository Services; Stage 3".

[15]   IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[16]   IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

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

[18]   IETF RFC 7396: "JSON Merge Patch".

[19]   IETF RFC 6902: "JavaScript Object Notation (JSON) Patch".

[20]   3GPP TR 21.900: "Technical Specification Group working methods".

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

3   Definitions and abbreviations

3.1   Definitions

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

3.2   Abbreviations

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

GPSI   Generic Public Subscription Identifier
NEF   Network Exposure Function
PCF   Policy Control Function
SUPI   Subscription Permanent Identifier
UDM   Unified Data Management
UDR   Unified Data Repository

4   Overview

The Unified Data Repository (UDR) is the network entity in the 5G Core Network (5GC) supporting the following functionalities:

- Storage and retrieval of subscription data as specified in 3GPP TS 29.505 [2];

- Storage and retrieval of policy data as specified in 3GPP TS 29.519 [3];

- Storage and retrieval of structured data for exposure as specified in 3GPP TS 29.519 [3];

- Storage and retrieval of application data (including Packet Flow Descriptions (PFDs) for application detection, application request information for multiple UEs) as specified in 3GPP TS 29.519 [3];

- Subscription to notification and the notification of subscribed data changes.

- Storage and retrieval of NF-Group Id mapping data.

Figures 4-1 shows the data storage architecture for the 5GC:
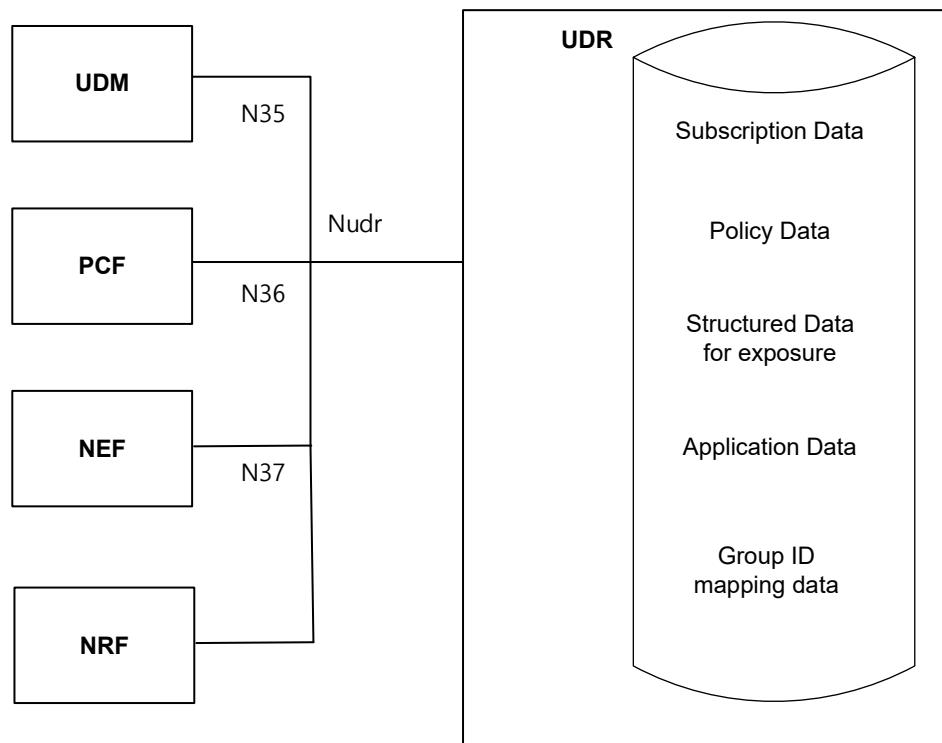
Figure 4-1: Data storage architecture

The Nudr interface is used by the network functions (i.e. UDM, PCF, NEF and NRF) to access a particular set of the data stored in the UDR.

> Note: Services offered by the UDR via the Nudr service based interface can also be consumed by the HSS as specified in 3GPP TS 23.632 clause 5.2.4.

5　Services offered by the UDR

5.1　Introduction

The UDR offers the following services via the Nudr interface:

- Nudr_DataRepository Service

  NOTE: This service corresponds to the Nudr_DataManagement service in 3GPP TS 23.501 [4], 3GPP TS 23.502 [5] and 3GPP TS 23.503 [6].

- Nudr_GroupIDmap Service

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Nudr_DataRepository	6.1	Unified Data Repository Service	TS29504_Nudr_DR.yaml	nudr-dr	A.2

Nudr_GroupIDmap	6.2	Unified Data Repository Service for NF-Group ID retrieval	TS29504_Nudr_GroupIDmap.yaml	nudr-group-id-map	A.3

5.2 Nudr_DataRepository Service

5.2.1 Service Description

5.2.1.1 Service and operation description

The UDR is acting as NF Service Producer. It provides Unified Data Repository service to the NF service consumer. The NF Service Consumers are the UDM, PCF and NEF.

For the Nudr_DataRepository service, the following service operations are defined:

- Query

- Create

- Delete

- Update

- Subscribe

- Unsubscribe

- Notify

This service allows NF service consumers to retrieve, create, update, modify and delete data stored in the UDR.

This service allows the NF service consumers to subscribe/unsubscribe the data change notification and to be notified of the data change.

5.2.1.2 Service operation and data access authorization

UDR provides one Nudr_DataRepository service to all of the NF consumers, while different types of data may have different data access authorizations, the UDR shall be able to have the authorization management mechanism to guarantee the safety of data access.

And the information in the Nudr_DataRepository service operation should be able to identify the NF type of the consumer and the service operation type or name, and to indicate the requested data information including the data set and data subset, and the resource/data identifier. All HTTP methods for the service operation shall include the information in the appropriate place of the HTTP message.

If there is an illegal service operation or data access request initiated by a NF consumer, the service failure response should be returned through the Nudr interface with an explicit cause value.

5.2.2 Service Operations

5.2.2.1 Introduction

This clause specifies the generic Nudr_DataRepository service operations towards the different data sets as shown in Figure 4-1.

The HTTP request of the service operations contains a resource URI that the {apiSpecificResourceUriPart} (see clause 4.4.2 in 3GPP TS 29.501 [8]) consists of a top-level segment and sub-level segment(s).

For Create, Query, Update and Delete operations, the top-level segment indicates one top level resource representing one of the data sets, which are defined as "/subscription-data", "/policy-data", "/exposure-data" and "/application-data" in Figure 6.1.3.1-1. And a certain child resource is indicated by of the end URI of the sub-level segments, which are defined in 3GPP TS 29.505 [2] for use when the top-level segment is "/subscription-data" and in 3GPP TS 29.519 [3] for use when the top-level segment is "/policy-data", "/exposure-data" or "/application-data".

For Subscribe/Unsubscribe to data change notification operations, the resource of the subscription to the notification should be as the child resource of each of the data sets (i.e. "/subscription-data", "/policy-data", "/exposure-data" and "/application-data"), which are indicated by the top-level segment in the URI. And the resource representation of the subscription to the notification should be indicated by the sub-level segment of each data set.

The following procedures for each operation should be taken as the common procedures and applicable to corresponding detail procedures with the same service operation in 3GPP TS 29.505 [2] and 3GPP TS 29.519 [3].

5.2.2.2 Query

5.2.2.2.1 General

The Query service operation is used to retrieve the data stored in the UDR. HTTP GET method shall be used for the service operation to request the certain data record(s). One piece of data records should be a data set, a data subset, a group of data in one data subset, or a specific data. If the data record(s) are the attribute(s), query parameter or the combination of query parameters should be used as the filters to control the content of result.

5.2.2.2.2 Data retrieval

Figure 5.2.2.2.2-1 shows a scenario where the NF service consumer (e.g. UDM, PCF or NEF) sends a request to the UDR to retrieve data.

Query parameters may be used for data retrieval:

i) Clause 5.2.2.2.3 specifies the query parameter used for retrieving subset of a resource;

ii) Other query parameters are defined in 3GPP TS 29.505 [2] and 3GPP TS 29.519 [3].
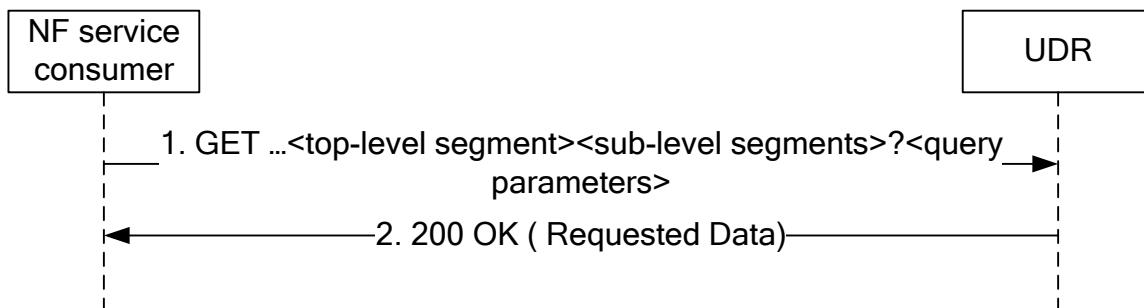
Figure 5.2.2.2.2-1: Retrieving Data

1. The NF service consumer shall send a GET request to the resource representing the data. Query parameters may be used to restrict the response to the requested data record(s) of the resource's representation. Query parameters may also indicate the features that the NF service consumer supports as described in clause 6.6.2 of 3GPP TS 29.500 [7].

2. On success, the UDR shall respond with "200 OK" with the message body containing the requested data record(s) restricted to the query parameters. (and thus also to the indicated features supported by the NF service consumer).

   On failure, the UDR shall return an appropriated error code with the error cause information.

The error codes of corresponding service operations in 3GPP TS 29.505 [2] and 3GPP TS 29.519 [3] shall align and comply with the failure response mechanism which is defined in 3GPP TS 29.500 [7].

5.2.2.2.3 Retrieval of subset of a resource

When a resource has multiple attributes, it is allowed for the NFs to retrieve a subset of the attributes. When the attribute is of type map, it is allowed for the NFs to retrieve individual member(s) of that map. For retrieval of subset of a resource, a new query parameter "fields" is defined to carry the identities of the attributes to be retrieved. The definition of "fields" query parameter is:

1) "fields" query parameter is of type array; and

2) each element of the array is of type string encoded as a JSON pointer as defined IETF RFC 6901 [9].

NOTE: identifying an individual element in the array is supported by JSON pointer, however it is not recommended to use this feature if the client is not exactly aware of the order of the members in the array.

If retrieval of subset of a particular resource is supported, then all the attributes of the corresponding data type of that resource shall be optional or conditional.

EXAMPLE 1:

Given the following representation of ExResource:

{

 "lv1Attr1": "value1"

 "lv1Attr2": "value2"

 "lv1Attr3": {

   "lv2Attr1": "value3"

   "lv2Attr2": "value4"

 }

}

To retrieve "lv1Attr1" and "lv2Attr2", the NF sends the following request:

GET /ExResource?fields=/lv1Attr1, /lv1Attr3/lv2Attr2

Upon success, the UDR then returns the following representation:

{

 "lv1Attr1": "value1"

 "lv1Attr3": {

   "lv2Attr2": "value4"

 }

}

EXAMPLE 2:

Given the following representation of ExResource:

{

 "Attr1": "value1"

 "Attr2": "value2"

 "AttrMap": {

```
  "Key1": {ExObject1}

  "Key2": {ExObject2}

 }

}
```

To retrieve "Attr1" and the second member of "AttrMap ", the NF sends the following request:

GET /ExResource?fields=/Attr1, /AttrMap/Key2

Upon success, the UDR then returns the following representation:

```
{

 "Attr1": "value1"

 "AttrMap": {

  "Key2": {ExObject2}

 }

}
```

5.2.2.3   Create

5.2.2.3.1   General

The Create service operation is used by the NF service consumer (e.g. NEF) to create the data into the UDR.

The following procedures using the Create service operation are supported:

- Data creation using PUT

- Data creation using POST

5.2.2.3.2   Data Creation using PUT

Figure 5.2.2.3.2-1 shows a scenario where the NF service consumer (e.g. NEF) sends a request to the UDR to create data. The parent resource of the resource identified by the resource URI shall be of archetype Store (see clause C.3 in 3GPP TS 29.501 [8]).
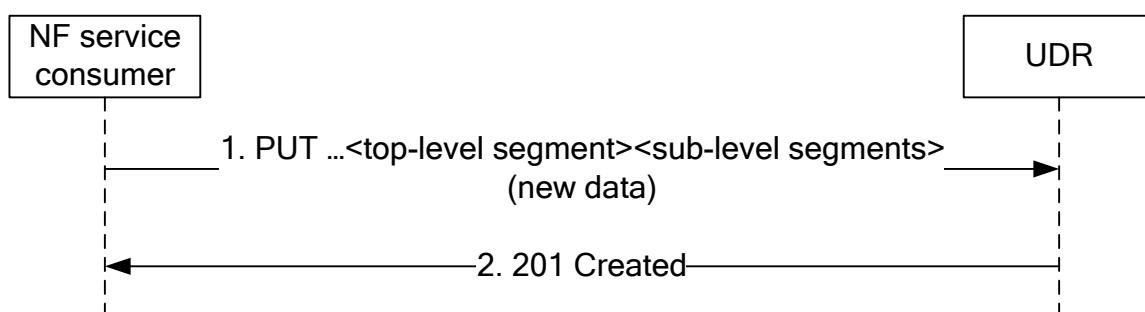

Figure 5.2.2.3.2-1: Creating Data using PUT

1. The NF service consumer shall send a PUT request to the resource representing the data. The payload body of the PUT request shall contain the representation of the new data.

2. On success, the UDR shall respond with "201 Created" with the payload containing the representation of the created data, and the "Location" header shall be present and contains the URI of the created data.

On failure, the UDR shall return an appropriated error code with the error cause information.

5.2.2.3.3 Data Creation using POST

Figure 5.2.2.3.3-1 shows a scenario where the NF service consumer (e.g. NEF) sends a request to the UDR to create data. The resource identified by the resource URI shall be of archetype Collection (see clause C.2 in 3GPP TS 29.501 [8]).
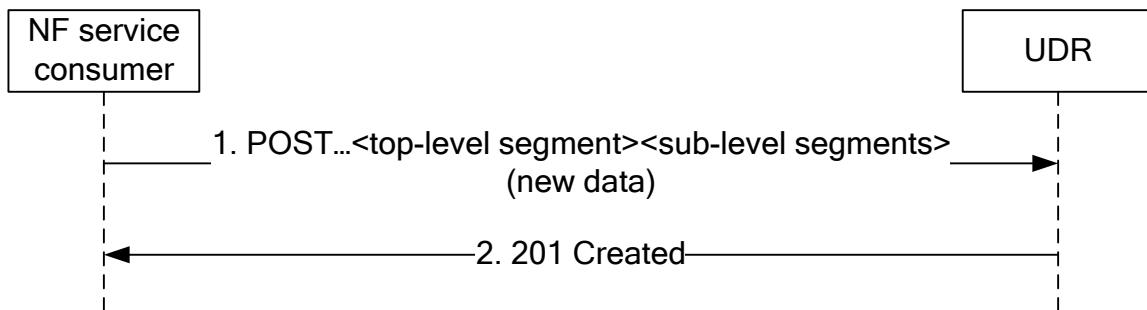
Figure 5.2.2.3.3-1: Creating Data using POST

1. The NF service consumer shall send a POST request to create the new data record as the child resource of the parent resource in the UDR. The payload body of the POST request shall contain the representation of the new data.

2. The UDR generates the data identifier and constructs the URI for the created data record by appending the data identifier to the parent resource URI received as request URI of the POST request.

   On success, the UDR shall respond with "201 Created" with the payload containing the representation of the created data, and the "Location" header shall be present and contains the URI of the created data.

   On failure, the UDR shall return an appropriated error code with the error cause information.

5.2.2.4 Delete

5.2.2.4.1 General

The Delete service operation is used by the NF service consumer (e.g. NEF) to remove the data from the UDR.

The following procedures using the Delete service operation are supported:

-   Data Deletion

HTTP DELETE method shall be used.

5.2.2.4.2 Deleting Data

Figure 5.2.2.4.2-1 shows a scenario where the NF service consumer (e.g. NEF) sends a request to the UDR to delete a data record.
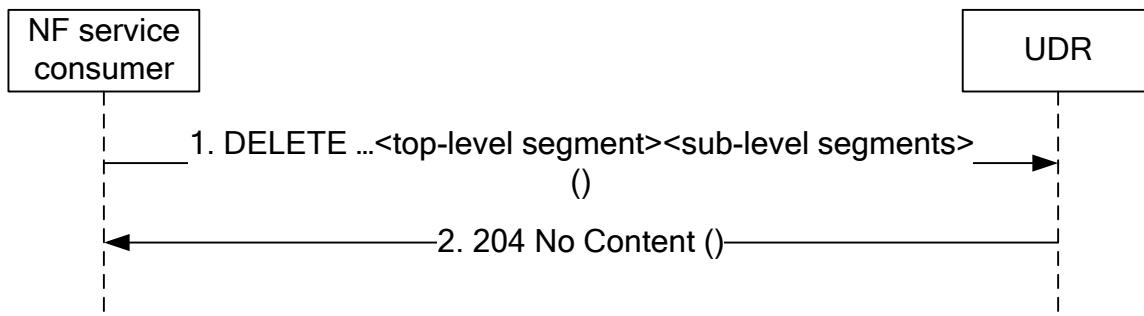
Figure 5.2.2.4.2-1: Deleting Data

1. The NF service consumer shall send a DELETE request to the resource representing the data. The payload body of the request shall be empty.

2. On success, the UDR shall respond with "204 No Content", the payload body of the DELETE response shall be empty.

   On failure, the UDR shall return an appropriated error code with the error cause information.

5.2.2.5 Update

5.2.2.5.1 General

The Update service operation is used by the NF service consumer (e.g. UDM, PCF or NEF) to update the data stored in the UDR.

The following procedures using the Update service operation are supported:

- Data Update using PATCH

- Data Update using PUT

HTTP PATCH method shall be used to add/create, delete or modify part of the value(s) in the data record (e.g. a specific data or a group of data in one data subset). HTTP PUT method shall be used to replace a complete data record.

5.2.2.5.2 Data Update using PATCH

Figure 5.2.2.5.2-1 shows a scenario where the NF service consumer (e.g. UDM, PCF or NEF) sends a request to the UDR to update some parts of the data record.
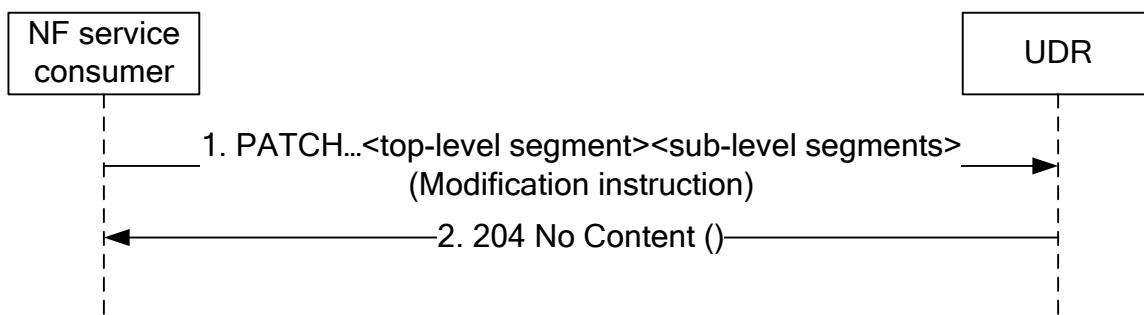
Figure 5.2.2.5.2-1: Data Updating using PATCH

1. The NF service consumer shall send a PATCH request to the resource representing the data record. The payload body contains the modification instruction towards the data record.

2. On success, the UDR shall respond with "204 No Content".

   On failure, the UDR shall return an appropriated error code with the error cause information.

5.2.2.5.3 Data Update using PUT

Figure 5.2.2.5.3-1 shows a scenario where the NF service consumer (e.g. UDM, PCF or NEF) sends a request to the UDR to update the whole data record.
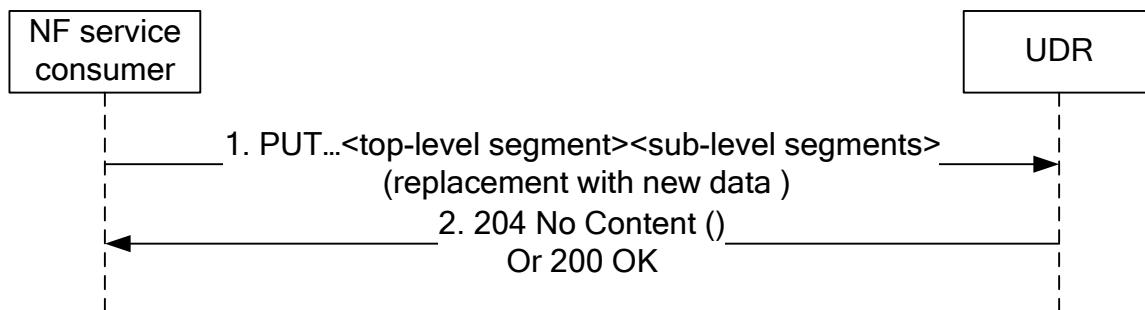

Figure 5.2.2.5.3-1: Data Updating using PUT

1. The NF service consumer shall send a PUT request to the resource representing the data record. The payload body contains the new data for the resource.

2. On success, the UDR shall respond with "204 No Content" or "200 OK".

   On failure, the UDR shall return an appropriated error code with the error cause information.

5.2.2.6 Subscribe

5.2.2.6.1 General

The Subscribe service operation is used for the NF service consumer to explicitly subscribe to the data change notification from the UDR.

Permanent Subscription Data i.e. sub-resources of the ProvisionedData resource (see 3GPP TS 29.505 [2]) can be modified only by means of provisioning at the UDR and may be (as a deployment option) implicitly subscribed by the UDM as described in 3GPP TS 29.501 [8] clause 4.6.2.2.1. If so and when a data modification of permanent subscription data occurs by means of provisioning and there is the need to notify at least one serving node (e.g. AMF, SMF, SMSF), the UDR shall select one of the suitable and available UDMs (as discovered via the NRF) and send a notification using the callback URI provided by the NRF during UDM discovery.

5.2.2.6.2 NF service consumer subscribes to notifications to UDR

Figure 5.2.2.6.2-1 shows a scenario where the NF service consumer (e.g. UDM, PCF or NEF) sends a request to the UDR to subscribe to data change notifications.
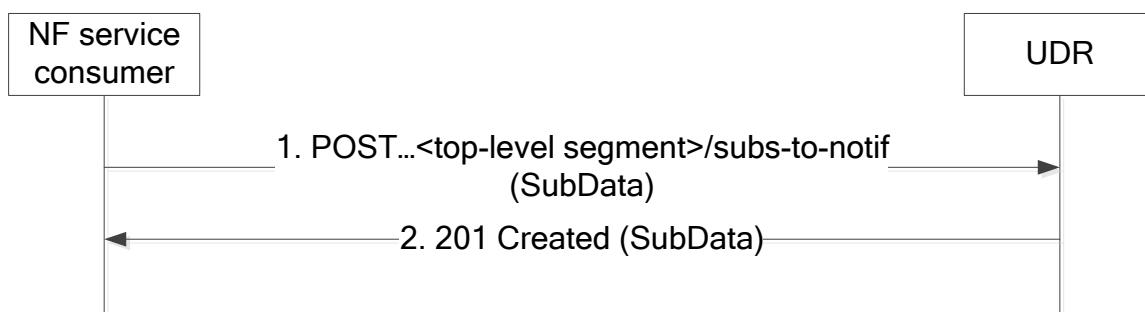
Figure 5.2.2.6.2-1: subscribing to data change notifications

1. The NF service consumer sends a POST request to the parent resource (...<top-level segment>/subs-to-notif). The NF service consumer describes the notifications it wants to receive, and it also indicates the features it supports (see clause 6.6.2 of 3GPP TS 29.500 [7]). The request may contain an expiry time, suggested by the NF Service Consumer as a hint, representing the time upto which the subscription is desired to be kept active.

2. On success, the UDR responds with "201 Created" with the message body containing a representation of the created subscription and indicating the supported features (see clause 6.6.2 of 3GPP TS 29.500 [7]). The Location HTTP header shall contain the URI of the created subscription. In subsequent notifications according to clause 5.2.2.8.2, the UDR only uses the indicated supported features.

The response based on operator policies and taking into account the expiry time included in the request, may contain an expiry time (i.e a future timestamp), as determined by the UDR, after which the subscription becomes invalid. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. Once the subscription expires, if the NF Service Consumer wants to keep receiving notifications, it shall create a new subscription in the UDR. The UDR shall not provide the same expiry time (i.e a future timestamp) for many subscriptions in order to avoid all of them expiring and recreating the subscription at the same time. If the expiry time is not included in the response, the NF Service Consumer shall consider the subscription to be valid without an expiry time.

On failure, the UDR returns an appropriated error code with the error cause information.

5.2.2.6.3 Stateless UDM subscribes to notifications to UDR

Figure 5.2.2.6.3-1 shows a scenario where the stateless UDM subscribes to notification to the UDR.
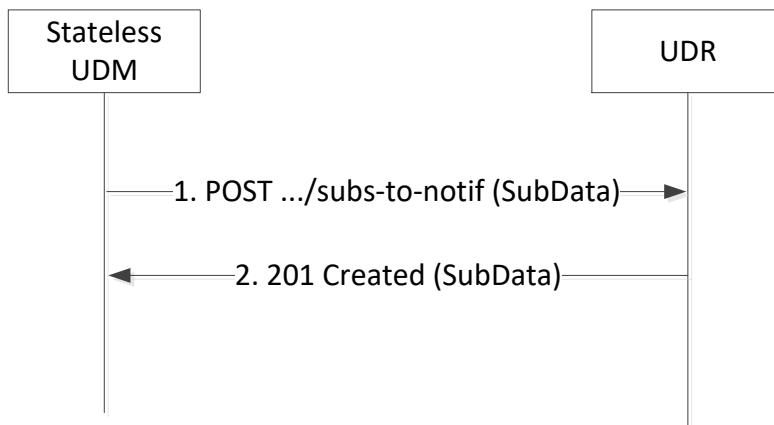
Figure 5.2.2.6.3-1: subscribing to data change notifications via stateless UDM

1. The stateless UDM sends a POST request to the UDR to subscribe to the notifications.

   The SubData in the POST request body shall indicate the same data for which a change will trigger a notification.

   The SubData in the POST request body shall contain a callbackReference URI to which the notifications will be sent to. The host part of the callbackReference URI shall be set to the FQDN of the UDM set to which the stateless UDM belongs.

   The SubData in the POST request body shall contain an original callbackReference URI of the NF which initially triggers the subscription.

   The request may contain an expiry time, suggested by the NF Service Consumer as a hint, representing the time upto which the subscription is desired to be kept active.

2. On success, the UDR responds with "201 Created" with the message body containing a representation of the created subscription. The Location HTTP header shall contain the URI of the created subscription and that URI shall contain the subscription ID allocated by the UDR.

   The response based on operator policies and taking into account the expiry time included in the request, may contain an expiry time (i.e a future timestamp), as determined by the UDR, after which the subscription becomes invalid. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. Once the subscription expires, if the NF Service Consumer wants to keep receiving notifications, it shall create a new subscription in the UDR. The UDR shall not provide the same expiry time (i.e a future timestamp) for many subscriptions in order to avoid all of them expiring and recreating the subscription

at the same time. If the expiry time is not included in the response, the NF Service Consumer shall consider the subscription to be valid without an expiry time.

On failure, the UDR returns an appropriated error code with the error cause information.

5.2.2.7 Unsubscribe

5.2.2.7.1 General

The Unsubscribe service operation is used for the NF service consumer to unsubscribe to the data change notification from the UDR.

5.2.2.7.2 Unsubscribe service operation

Figure 5.2.2.7.2-1 shows a scenario where the NF service consumer (e.g. UDM, PCF or NEF) sends a request to the UDR to unsubscribe to data change notifications.
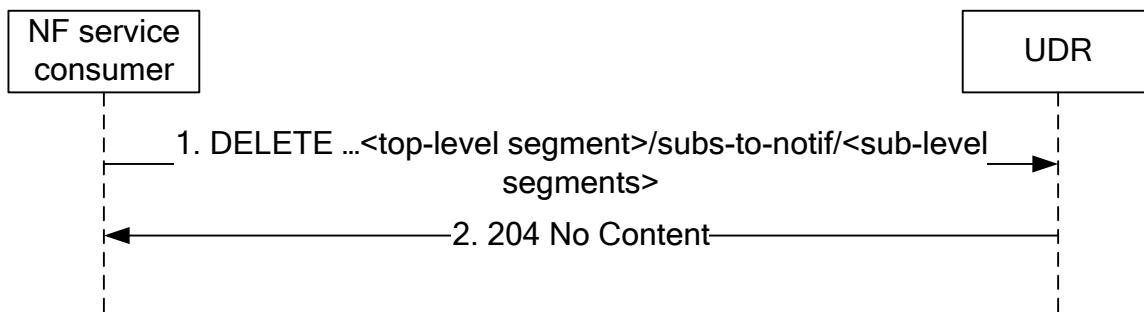

Figure 5.2.2.7.2-1: Unsubscribing to the data change notifications

1. The NF service consumer sends a DELETE request to the resource identified by the URI previously received during subscription creation, i.e. in the Location header field of the HTTP 201 Created response.

2. On success, the UDR responds with "204 No Content".

    On failure, the UDR returns an appropriated error code with the error cause information.

5.2.2.8 Notify

5.2.2.8.1 General

The Notify service operation is used for the UDR to notify the data change notification to the previous subscribe operation requestor.

5.2.2.8.2 Notification to NF service consumer on data change

Figure 5.2.2.8.2-1 shows a scenario where the UDR notifies the NF service consumer about the subscribed data change. The request contains the CallbackReference URI as previously received in the subscribe operation (see clause 5.2.2.6).
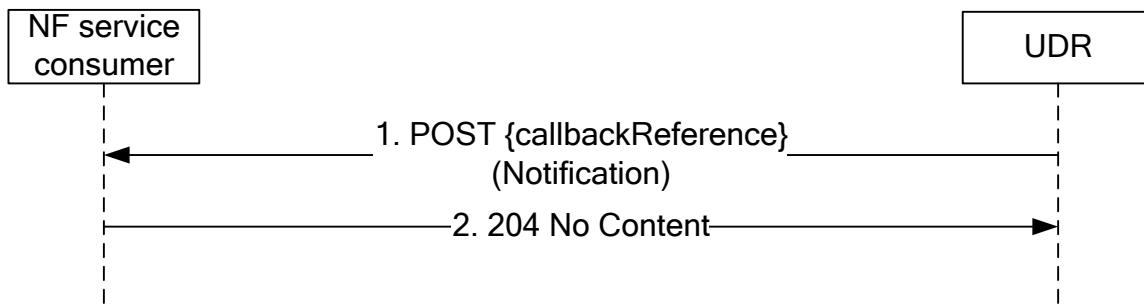
Figure 5.2.2.8.2-1: Data Change Notification

1. The UDR sends a POST request to the callbackReference URI as provided by the NF service consumer in the subscribe operation.

2. On success, the NF service consumer responds with "204 No Content".

   On failure, the NF service consumer responds an appropriated error code with the error cause information.

5.2.2.8.3 Notification to stateless UDM on data change

Figure 5.2.2.8.3-1 shows a scenario where the UDR notifies the NF service consumer about the subscribed data change.
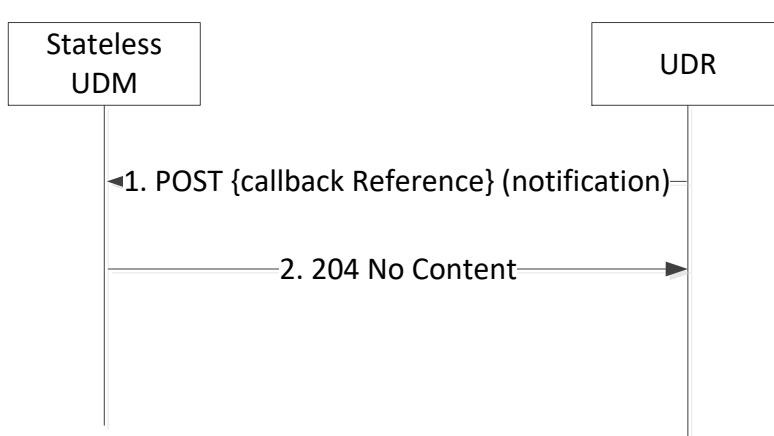
Figure 5.2.2.8.3-1: Data Change Notification to stateless UDM

1. The UDR sends a POST request to the callbackReference URI as provided by the stateless UDM in the subscribe operation.

   The notification in the POST request body shall contain the original callbackReference URI which is received in step 1 of Figure 5.2.2.6.3-1.

2. On success, the stateless UDM responds with "204 No Content".

On failure, the stateless UDM responds an appropriated error code with the error cause information.

5.3 Nudr_GroupIDmap Service

5.3.1 Service Description

5.3.1.1 Service and operation description

The Nudr_GroupIDmap service may be used by NF service consumers (e.g. NRF) to retrieve the NF-GroupId for a given NF type and subscriber identifier; see 3GPP TS 23.502 [5].

For the Nudr_GroupIDmap service, the following service operations are defined:

- Query

This service allows NF service consumers to retrieve, NfGroupId data stored in the UDR.

5.3.2 Service Operations

5.2.2.1 Introduction

The service operations defined for the Nudr_GroupIDmap service are as follows:

- Query: It allows an NF consumer (e.g. NRF) to retrieve the NF group ID for a given NF type and subscriber.

5.3.2.2 Query

5.3.2.2.1 General

The following procedure using the Query service operation is supported:

- NF-Group ID Retrieval

5.3.2.2.2 NF-Group ID retrieval

Figure 5.3.2.2.2-1 shows a scenario where the NF service consumer (e.g. NRF) sends a request to the UDR to retrieve the UDM-group ID.
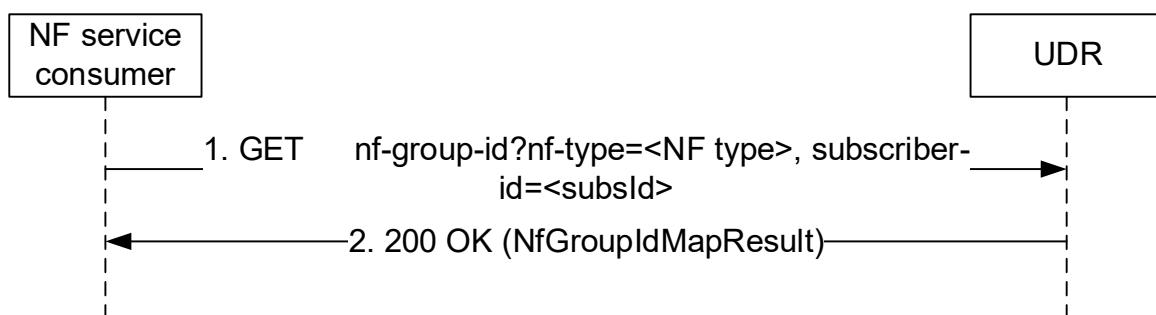
Figure 5.3.2.2.2-1: Retrieving NF-Group Id

1. The NF service consumer shall send a GET request to the resource representing the data. Query parameters shall be used to identify the NF type (e.g. UDM) of the requested NF-Group ID (e.g. UDM-Group ID) and the subscriber-id.

2. On success, the UDR shall respond with "200 OK" with the message body containing the requested data

   On failure, the UDR shall return an appropriated error code with the error cause information.

6 API Definitions

6.1 Nudr_DataRepository Service API

6.1.1 API URI

The Nudr-dr shall use the Nudr-dr 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 [8], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [8].

- The <apiName> shall be "nudr-dr".

- The <apiVersion> shall be "v2".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

6.1.2 Usage of HTTP

6.1.2.1 General

Nudr service shall comply with the usage of HTTP/2.0 protocol over Service Based Interfaces. (See Clause 5, 3GPP TS 29.500[7]).

6.1.2.2 HTTP standard headers

6.1.2.2.1 General

The usage of HTTP standard headers shall be supported on Nudr interface as defined in clause 5.2.2 of 3GPP TS 29.500 [7].

6.1.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in IETF RFC 8259 [11], shall be used as content type of the HTTP bodies specified in the present specification as indicated in clause 5.4 of 3GPP TS 29.500 [7].

- The Problem Details JSON Object (IETF RFC 7807 [17]). The use of the Problem Details JSON object in a HTTP response body shall be signalled by the content type "application/problem+json".

- JSON Merge Patch (IETF RFC 7396 [18]. The use of the JSON Merge Patch format in a HTTP request body shall be signalled by the content type "application/merge-patch+json".

- JSON Patch (IETF RFC 6902 [19]). The use of the JSON Patch format in a HTTP request body shall be signalled by the content type "application/json-patch+json".

6.1.2.2.3 Cache-Control

As described in IETF RFC 7234 [16] clause 5.2, a "Cache-Control" header should be included in HTTP responses carrying a representation of cacheable resources (e.g. SessionManagementSubscriptionData). If it is included, it shall contain a "max-age" value, indicating the amount of time in seconds after which the received response is considered stale.

The "max-age" value shall be configurable by operator policy.

6.1.2.2.4 ETag

As described in IETF RFC 7232 [15] clause 2.3, an "ETag" (entity-tag) header should be included in HTTP responses carrying a representation of cacheable resources (e.g. AccessAndMobilitySubscriptionData) or modifyable resources (e.g. Amf3GppAccessRegistration) to allow an NF Service Consumer performing a conditional GET request with "If-None-Match" header or a conditional POST / PUT / PATCH / DELETE request with "If-Match" header. If it is included, it shall contain a server-generated strong validator, that allows further matching of this value (included in subsequent client requests) with a given resource representation stored in the server or in a cache.

6.1.2.2.5 If-None-Match

As described in IETF RFC 7232 [15] clause 3.2, an NF Service Consumer may issue conditional GET request towards UDR by including an "If-None-Match" header in HTTP requests containing one or several entity tags received in previous responses for the same resource.

6.1.2.2.5a If-Match

As described in IETF RFC 7232 [15] clause 3.1, an NF Service Consumer may issue conditional POST / PUT / PATCH / DELETE request towards UDR by including an "If-Match" header in HTTP requests containing an entity tag received in previous responses for the same resource.

6.1.2.2.6 Last-Modified

As described in IETF RFC 7232 [15] clause 2.2, a "Last-Modified" header should be included in HTTP responses carrying a representation of cacheable resources (e.g. SmfSelectionSubscriptionData) to allow an NF Service Consumer performing a conditional request with "If-Modified-Since" header.

6.1.2.2.7 If-Modified-Since

As described in IETF RFC 7232 [15] clause 3.3, an NF Service Consumer may issue conditional GET request towards UDR, by including an "If-Modified-Since" header in HTTP requests.

6.1.2.2.8 When to Use Entity-Tags and Last-Modified Dates

Both "ETag" and "Last-Modified" headers should be sent in the same HTTP response as stated in IETF RFC 7232 [15] clause 2.4.

NOTE: "ETag" is a stronger validator than "Last-Modified" and is preferred.

If the UDR included an "ETag" header with the resource then a conditional GET request for this resource shall be performed with the "If-None-Match" header, and a POST / PUT / PATCH / DELETE request for this resource shall be performed with the "If-Match" header.

6.1.2.3 HTTP custom headers

6.1.2.3.1 General

The custom HTTP headers applicable to Nudr service are specified in the following clauses.

6.1.2.3.2 3gpp-Sbi-Message-Priority

Nudr interface shall support 3gpp-Sbi-Message-Priority custom header. The header contains the HTTP/2 message priority value. See details in Clause 5.2.3.2.2 of 3GPP TS 29.500 [7].

6.1.2.3.3 3gpp-Sbi-Notification-Correlation

The 3gpp-Sbi-Notification-Correlation header field is used by a NF in a UDR resource create/update/delete request to indicate the subscription context(s) whose notification needs to be disabled when triggered as consequence of a request including this header. Subsequent create/update/delete requests that do not include the 3gpp-Sbi-Notification-Correlation header trigger the corresponding notifications as per currently defined procedures.

This header contains subscription identifier(s), as provided by the UDR during the subscribe operation.

The encoding of the header follows the ABNF as defined in IETF RFC 7230 [12].

3gpp-Sbi-Notification-Correlation = "3gpp-Sbi-Notification-Correlation" ":" 1*(OWS subscriptionId ",")

subscriptionId = token

See clause 3.2.6 of IETF RFC 7230 [12] for the "token" definition.

EXAMPLE: 3gpp-Sbi-Notification-Correlation: subsid123, subsid345.

6.1.3 Resources

6.1.3.1 Overview

//{apiRoot}/nudr-dr/v2
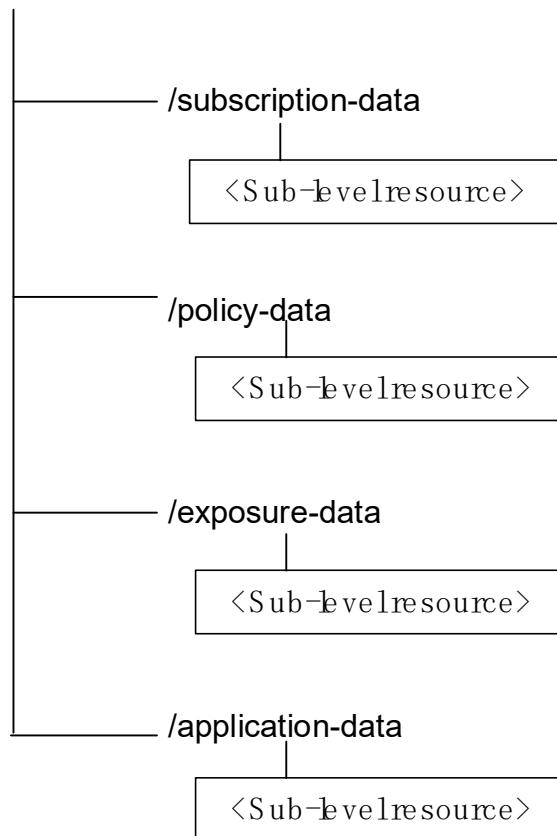
Figure 6.1.3.1-1: Resource URI structure of the nudr-dr API

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
SubscriptionData	/subscription-data	none	For sub-level resource names, resource URIs and HTTP methods see 3GPP TS 29.505 [2]
PolicyData	/policy-data	none	For sub-level resource names, resource URIs and HTTP methods see 3GPP TS 29.519 [3]
StructuredDataForExposure	/exposure-data	none	For sub-level resource names, resource URIs and HTTP methods see 3GPP TS 29.519 [3]
ApplicationData	/application-data	none	For sub-level resource names, resource URIs and HTTP methods see 3GPP TS 29.519 [3]

6.1.3.2   SubscriptionData

See 3GPP TS 29.505 [2].

6.1.3.3   PolicyData

See 3GPP TS 29.519 [3].

6.1.3.4   StructuredDataForExposure

See 3GPP TS 29.519 [3].

6.1.3.5   ApplicationData

See 3GPP TS 29.519 [3].

6.1.5   Notifications

6.1.5.1   General

This clause specifies the general mechanism of notifications of changed data, which are stored in the UDR, and the mechanism should be applicable to the data change notifications, which are specified in 3GPP TS 29.505[2] and 3GPP TS 29.519[3].

6.1.5.2   Data Change Notification

The POST method shall be used for Data Change Notifications and the URI shall be as provided during the subscription procedure.

Resource URI: {callbackReference}

Support of POST request data structures should contain the object of changed data and conditionally the URI of original Callback reference, which is received from the original subscribed NF.

6.1.6   Error Handling

Table 6.1.6-1 lists common response body data structures used within the nudr_dr API

Table 6.1.6-1: Common Response Body Data Structures

Data type	P	Cardinality	Response codes	Description
ProblemDetails	O	0..1	4xx, 5xx responses	For error status codes, the UDR may provide detailed information.
NOTE: In addition common data structures as defined in 3GPP TS 29.500 [7] are supported.				

The "ProblemDetails" data structure may contain a "cause" attribute to indicate the application error, see 3GPP TS 29.571 [10]. The values for "cause" attribute are defined in table 6.1.6-2.

Table 6.1.6-2: Application Errors

Application Error	HTTP status code	Description
NF_TYPE_NOT_ALLOWED	403 Forbidden	The target data set is not permitted to access for the NF type of the NF consumer.
UNSUPPORTED_MONITORED_URI	501 Not Implemented	The subscribe service operation is not able to be implemented due to invalid resource URI to be monitored).
USER_NOT_FOUND	404 Not Found	The user indicated in the HTTP/2 request does not exist in the UDR.
DATA_NOT_FOUND	404 Not Found	The data indicated in the HTTP/2 request is unavailable in the UDR.
INCORRECT_CONDITIONAL_GET_REQUEST	412 Precondition Failed	One or more conditions given in the request header fields evaluated to false when tested in the UDR.
UNPROCESSABLE_REQUEST	422 Unprocessable Entity	The request cannot be procesed due to semantic errors when trying to process a patch method..
DATABASE INCONSISTENCY	500 Internal Server Error	Requested data cannot be returned due to database inconsistency
RESOURCE_TEMP_MOVED	307 Temporary Redirect	The resource is unavailable in the current target URI but can be temporarily found in an alternative URI.
RESOURCE_MOVED	308 Permanent Redirect	The resource is unavailable in the current target URI but can be permanently found in an alternative URI.
GROUP_IDENTIFIER_NOT_FOUND	404 Not Found	The group identifier does not exist.
MODIFICATION_NOT_ALLOWED	403 Forbidden	Modification of the target resource representation is not permitted.
NOTE: The error codes shall apply to both 3GPP TS 29.505 [2] and 3GPP TS 29.519 [3]. In addition error codes shall comply with the definition in clause 5.2.7.2 of 3GPP TS 29.500 [7].		

6.1.7   Security

As indicated in 3GPP TS 33.501 [12], the access to the Nudr_DataRepository API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [13]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [14]) plays the role of the authorization server.

If Oauth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nudr_DataRepository API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [14], 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 Nudr_DataRepository service.

The Nudr_DataRepository API defines the following scopes for OAuth2 authorization:

Table 6.1.7-1: Oauth2 scopes defined in Nudr_DataRepository API

Scope	Description
"nudr-dr"	Access to the Nudr DataRepository API
"nudr-dr:subscription-data:authentication-subscription:read"	Access to read the AuthenticationSubscription resource of the SubscriptionData data set.
"nudr-dr:subscription-data:authentication-subscription:modify"	Access to update the AuthenticationSubscription resource of the SubscriptionData data set.

6.1.8   Feature negotiation

The optional features in table 6.1.8-1 are defined for the Nudr_DataRepository API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [7].

Table 6.1.8-1: Supported Features

Feature number	Feature Name	Description
1	ResourceRemovalNotificationPolicyData	This feature indicates the support of the complete removal of a Policy Data resource.
2	ResourceNotificationExposureDataFix	This feature indicates the support of corrections to Notifications of data changes in the Exposure Data resource.
3	DomainNameProtocol	This feature supports the additional protocol matching condition for the domain name in PFD data.
4	EnhancedBackgroundDataTransfer	This feature indicates the support of applying the Background Data Transfer Policy to a future PDU session requested by the AF for Policy Data resource and Application Data resource as defined in 3GPP TS 29.519 [3]. This feature requires the support of SessionManagementPolicyDataPatch feature to update Background Data Transfer data within the Session Management Policy Data.
5	MacAddressRange	This feature indicates the support of a set of MAC addresses with a specific range for the traffic filter in the application data resource as specified in 3GPP TS 29.519 [3].
6	MultiTemporalCondition	This feature indicates the support of multiple temporal validity conditions in the Traffic Influence Data resource as specified in 3GPP TS 29.519 [3].
7	PatchReport	If some of the modifications included in the PATCH request are not successfully implemented, the UDM reports the result of PATCH request execution to the consumer. See clause 5.2.7.2 of 3GPP TS 29.500 [7].
8	URLLC	This feature indicates support of Ultra Reliable Low Latency Communication (URLLC) requirements, i.e. AF application relocation and UE address(es) preservation in the Application Data resource as specified in 3GPP TS 29.519 [3].
9	SessionManagementPolicyDataPatch	This feature indicates the support of the HTTP PATCH method to update the session management policy data defined in a Policy Data resource as specified in 3GPP TS 29.519 [3].
10	ConditionalSubscriptionwithPartialNotification	This feature indicates the support of subscription to notification of resource data changes conditioned to the change occurs in a fragment of the resource. It applies for Policy Data resources as specified in 3GPP TS 29.519 [3].
11	EnhancedInfluDataNotification	This feature indicates the support of enhancement of data change Notifications in the Influence Data resource as specified in 3GPP TS 29.519 [3].
12	PerUePerSnAuthStatus	This feature indicates the support of the Individual authentication status per UE per serving network as specified in 3GPP TS 29.505 [2].
13	OpSpecDataMapNotification	This feature indicates the support of the notification of data changes in the OperatorSpecificData resource by including the complete map of Operator Specific Data Containers. It applies to Policy Data resources as specified in 3GPP TS 29.519 [3].

6.2 Nudr_GroupIDmap Service API

6.2.1 API URI

URIs of this API shall have the following root:

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

where "apiRoot" is defined in clause 4.4.1 of 3GPP TS 29.501 [8], the "apiName" shall be set to "nudr-group-id-map" and the "apiVersion" shall be set to "v1" for the current version of this specification.

6.2.2 Usage of HTTP

6.2.2.1 General

HTTP/2, as defined in IETF RFC 7540 [13], shall be used as specified in clause 5 of 3GPP TS 29.500 [7].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [7].

HTTP messages and bodies for the Nudr_GroupIDmap service shall comply with the OpenAPI [21] specification contained in Annex A3.

6.2.2.2 HTTP standard headers

6.2.2.2.1 General

The usage of HTTP standard headers shall be supported on Nudr interface as defined in clause 5.2.2 of 3GPP TS 29.500 [7].

6.2.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in IETF RFC 8259 [11], shall be used as content type of the HTTP bodies specified in the present specification as indicated in clause 5.4 of 3GPP TS 29.500 [7].

- The Problem Details JSON Object (IETF RFC 7807 [17]). The use of the Problem Details JSON object in a HTTP response body shall be signalled by the content type "application/problem+json".

6.2.2.2.3 Cache-Control

As described in IETF RFC 7234 [16] clause 5.2, a "Cache-Control" header should be included in HTTP responses carrying a representation of cacheable resources. If it is included, it shall contain a "max-age" value, indicating the amount of time in seconds after which the received response is considered stale.

The "max-age" value shall be configurable by operator policy.

6.2.2.2.4 ETag

As described in IETF RFC 7232 [15] clause 2.3, an "ETag" (entity-tag) header should be included in HTTP responses carrying a representation of cacheable resources to allow an NF Service Consumer performing a conditional GET request with "If-None-Match" header. If it is included, it shall contain a server-generated strong validator, that allows further matching of this value (included in subsequent client requests) with a given resource representation stored in the server or in a cache.

6.2.2.2.5 If-None-Match

As described in IETF RFC 7232 [15] clause 3.2, an NF Service Consumer may issue conditional GET request towards UDR by including an "If-None-Match" header in HTTP requests containing one or several entity tags received in previous responses for the same resource.

6.2.2.2.6 Last-Modified

As described in IETF RFC 7232 [15] clause 2.2, a "Last-Modified" header should be included in HTTP responses carrying a representation of cacheable resources (e.g. SmfSelectionSubscriptionData) to allow an NF Service Consumer performing a conditional request with "If-Modified-Since" header.

6.2.2.2.7 If-Modified-Since

As described in IETF RFC 7232 [15] clause 3.3, an NF Service Consumer may issue conditional GET request towards UDR, by including an "If-Modified-Since" header in HTTP requests.

6.2.2.2.8 When to Use Entity-Tags and Last-Modified Dates

Both "ETag" and "Last-Modified" headers should be sent in the same HTTP response as stated in IETF RFC 7232 [15] clause 2.4.

NOTE: "ETag" is a stronger validator than "Last-Modified" and is preferred.

If the UDR included an "ETag" header with the resource then a conditional GET request for this resource shall be performed with the "If-None-Match" header.

6.2.2.3 HTTP custom headers

6.2.2.3.1 General

In this release of this specification, no custom headers specific to the Nudr_GroupIDmap service are defined. For 3GPP specific HTTP custom headers used across all service-based interfaces, see clause 5.2.3 of 3GPP TS 29.500 [7].

6.2.3 Resources

6.2.3.1 Overview

//{apiRoot}/nudr-group-id-map/<apiVersion>

/nf-group-ids
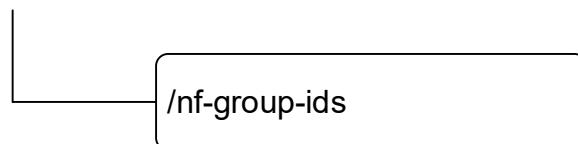
Figure 6.2.3.1-1: Resource URI structure of the nudr-group-id-map API

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	Description
NfGroupIds	/nf-group-ids	GET	

6.2.3.2 Resource NfGroupIds

6.2.3.2.1 Description

This resource represents the NF-Group IDs for a subscriber.

6.2.3.2.2 Resource Definition

Resource URI: {apiRoot}/nudr-group-id-map/<apiVersion>/nf-group-ids

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

Table 6.2.3.2.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See clause 6.2.1

6.2.3.2.3 Resource Standard Methods

6.2.3.2.3.1 GET

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

Table 6.2.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
nf-type	array(NFType)	M	1..N	see 3GPP TS 29.510 [14]
subscriberId	SubscriberId	M	1	Represents the Subscription Identifier SUPI or GPSI or IMPI or IMPU (see 3GPP TS 23.501 [4] clause 5.9.2 and clause 5.9.8) pattern: ^(imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^@]+@[^@]+|impi-.+|impu-.+|.+)$
NOTE:	The format of the query parameter subscriberId is in line with the yaml and thus does not follow the lower-with-hyphen format specified in 3GPP TS 29.501 [8].			

This method shall support the request data structures specified in table 6.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.3.2.3.1-3.

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

Data type	P	Cardinality	Description
n/a			

Table 6.2.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
NfGroupIdMapResult	M	1	200 OK	Upon success, a response body containing the NF-Group IDs for the requested NF types shall be returned.
ProblemDetails	O	0..1	404 Not Found	The "cause" attribute may be set to one of the following application errors: - USER_NOT_FOUND
NOTE:	In addition common data structures as listed in table 5.2.7.1-1 of 3GPP TS 29.500 are supported.			

6.2.5 Notifications

In this release of this specification, no notifications are defined for the Nudr_GroupIDmap Service.

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 structured data types defined for the Nudr_GroupIDmap service API. For simple data types defined for the Nudr_GroupIDmap service API see table 6.2.6.3.2-1.

Table 6.2.6.1-1: Nudr_GroupIDmap specific Data Types

Data type	Clause defined	Description
NfGroupIdMapResult	6.2.6.2.2	

Table 6.2.6.1-2 specifies data types re-used by the Nudr_GroupIDmap service API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nudr_GroupIDmap service API.

Table 6.2.6.1-2: Nudr_GroupIDmap re-used Data Types

Data type	Reference	Comments
ProblemDetails	3GPP TS 29.571 [10]	Common data type used in response bodies
NFType	3GPP TS 29.510 [14]	
NfGroupId	3GPP TS 29.571 [10]	

6.2.6.2 Structured data types

6.2.6.2.1 Introduction

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

6.2.6.2.2 Type: NfGroupIdMapResult

Table 6.2.6.2.2-1: Definition of type NfGroupIdMapResult

Attribute name	Data type	P	Cardinality	Description
nfGroupIDs	map(NfGroupId)	M	1..N	A map (list of key-value pairs where NFType serves as key) of NFGroupIds

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
SubscriberId	string	Pattern: ^(imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^@]+@[^@]+|impi-.+|impu-.+|.+)$

6.2.7 Error Handling

6.2.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [7].

6.2.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [7].

6.2.7.3 Application Errors

The common application errors defined in the Table 5.2.7.2-1 in 3GPP TS 29.500 [7] may also be used for the Nudr_GroupIDmap service. The following application errors listed in Table 6.2.7.3-1 are specific for the Nudr_GroupIDmap service.

Table 6.2.7.3-1: Application errors

Application Error	HTTP status code	Description
USER_NOT_FOUND	404 Not Found	The user does not exist in the HPLMN

6.2.8 Security

As indicated in 3GPP TS 33.501 [12], the access to the Nudr_GroupIDmap API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [13]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [14]) plays the role of the authorization server.

If Oauth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nudr_GroupIDmap API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [14], 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 Nudr_GroupIDmap service.

The Nudr_GroupIDmap API defines scopes for OAuth2 authorization as specified in 3GPP TS 33.501 [12]; it defines a single scope consisting on the name of the service (i.e., "nudr-group-id-map"), and it does not define any additional scopes at resource or operation level.

6.2.9 Feature Negotiation

The optional features in table 6.2.9-1 are defined for the Nudr_GroupIDmap API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [7].

Table 6.2.9-1: Supported Features

Feature number	Feature Name	Description

Annex A (normative): OpenAPI specification

A.1 General

This document specifies the common service operations and the top level data model for Nudr_DataRepository Service Based Interface. There are no specific HTTP methods or custom operations on the four top level resources in Table 6.1.3.1-1. Hence, the top level OpenAPI specification is not needed.

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 hosted, that uses the GitLab software version control system (see 3GPP TS 29.501 [8] clause 5.3.1 and 3GPP TR 21.900 [20] clause 5B).

A.2 Nudr_DataRepository API

This Annex specifies the formal definition of the Nudr_DataRepository service. It consists of OpenAPI 3.0.0 specifications, in YAML format.

The OpenAPI 3.0.0 definition related to SubscriptionData shall comply with the definition in 3GPP TS 29.505 [2].

The OpenAPI 3.0.0 definition related to PolicyData, StructuredDataForExposure and ApplicationData shall comply with the definition in 3GPP TS 29.519 [3].

The OpenAPI file for the Nudr_DataRepository API is defined as follows:

```
openapi: 3.0.0

info:
  version: 2.1.4
  title: 'Nudr_DataRepository API OpenAPI file'
  description: |
    Unified Data Repository Service.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.504 V16.8.0; 5G System; Unified Data Repository Services; Stage 3
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.504/'

servers:
  - description: API root
    url: '{apiRoot}/nudr-dr/v2'
    variables:
      apiRoot:
        default: https://example.com

security:
  - {}
  - oAuth2ClientCredentials:
      - nudr-dr

paths:
  /subscription-data/{ueId}/authentication-data/authentication-subscription:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1authentication-
data~1authentication-subscription'
  /subscription-data/{ueId}/authentication-data/authentication-status:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1authentication-
data~1authentication-status'
  /subscription-data/{ueId}/authentication-data/authentication-status/{servingNetworkName}:
```

```
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1authentication-
data~1authentication-status~1%7BservingNetworkName%7D'
  /subscription-data/{ueId}/ue-update-confirmation-data/sor-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1ue-update-
confirmation-data~1sor-data'
  /subscription-data/{ueId}/ue-update-confirmation-data/upu-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1ue-update-
confirmation-data~1upu-data'
  /subscription-data/{ueId}/ue-update-confirmation-data/subscribed-cag:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1ue-update-
confirmation-data~1subscribed-cag'
  /subscription-data/{ueId}/ue-update-confirmation-data/subscribed-snssais:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1ue-update-
confirmation-data~1subscribed-snssais'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/am-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1am-data'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/smf-selection-subscription-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1smf-selection-subscription-data'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/sm-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1sm-data'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/lcs-bca-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1lcs-bca-data'
  /subscription-data/{ueId}/context-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data'
  /subscription-data/{ueId}/context-data/amf-3gpp-access:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1amf-
3gpp-access'
  /subscription-data/{ueId}/context-data/amf-non-3gpp-access:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1amf-
non-3gpp-access'
  /subscription-data/{ueId}/context-data/smf-registrations:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1smf-
registrations'
  /subscription-data/{ueId}/context-data/smf-registrations/{pduSessionId}:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1smf-
registrations~1%7BpduSessionId%7D'
  /subscription-data/{ueId}/operator-specific-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1operator-specific-
data'
  /subscription-data/{ueId}/context-data/smsf-3gpp-access:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-
data~1smsf-3gpp-access'
  /subscription-data/{ueId}/context-data/smsf-non-3gpp-access:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-
data~1smsf-non-3gpp-access'
  /subscription-data/{ueId}/context-data/location:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-
data~1location'
  /subscription-data/{ueId}/context-data/ip-sm-gw:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1ip-
sm-gw'
  /subscription-data/{ueId}/context-data/mwd:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1mwd'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/sms-mng-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1sms-mng-data'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/sms-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1sms-data'
  /subscription-data/{ueId}/lcs-privacy-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1lcs-privacy-data'
  /subscription-data/{ueId}/lcs-mo-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1lcs-mo-data'
  /subscription-data/{ueId}/pp-data:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1pp-data'
  /subscription-data/{ueId}/context-data/ee-subscriptions:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1ee-
subscriptions'
  /subscription-data/{ueId}/context-data/ee-subscriptions/{subsId}:
      $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1ee-
subscriptions~1%7BsubsId%7D'
```

```yaml
  /subscription-data/{ueId}/context-data/ee-subscriptions/{subsId}/amf-subscriptions:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1ee-
subscriptions~1%7BsubsId%7D~1amf-subscriptions'
  /subscription-data/{ueId}/context-data/ee-subscriptions/{subsId}/smf-subscriptions:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1ee-
subscriptions~1%7BsubsId%7D~1smf-subscriptions'
  /subscription-data/group-data/{ueGroupId}/ee-subscriptions:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-
data~1%7BueGroupId%7D~1ee-subscriptions'
  /subscription-data/group-data/{ueGroupId}/ee-subscriptions/{subsId}:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-
data~1%7BueGroupId%7D~1ee-subscriptions~1%7BsubsId%7D'
  /subscription-data/group-data/{ueGroupId}/ee-profile-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-
data~1%7BueGroupId%7D~1ee-profile-data'
  /subscription-data/group-data/5g-vn-groups:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-data~15g-vn-groups'
  /subscription-data/group-data/5g-vn-groups/{externalGroupId}:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-data~15g-vn-
groups~1%7BexternalGroupId%7D'
  /subscription-data/group-data/5g-vn-groups/internal:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-data~15g-vn-
groups~1internal'
  /subscription-data/group-data/5g-vn-groups/pp-profile-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-data~15g-vn-groups~1pp-
profile-data'
  /subscription-data/{ueId}/ee-profile-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1ee-profile-data'
  /subscription-data/{ueId}/context-data/sdm-subscriptions:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1sdm-
subscriptions'
  /subscription-data/{ueId}/context-data/sdm-subscriptions/{subsId}:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1context-data~1sdm-
subscriptions~1%7BsubsId%7D'
  /subscription-data/shared-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1shared-data'
  /subscription-data/subs-to-notify:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1subs-to-notify'
  /subscription-data/subs-to-notify/{subsId}:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1subs-to-notify~1%7BsubsId%7D'
  /subscription-data/{ueId}/{servingPlmnId}/provisioned-data/trace-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-
data~1%7BueId%7D~1%7BservingPlmnId%7D~1provisioned-data~1trace-data'
  /subscription-data/{ueId}/identity-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1identity-data'
  /subscription-data/{ueId}/operator-determined-barring-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1operator-
determined-barring-data'
  /subscription-data/{ueId}/nidd-authorization-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1nidd-
authorization-data'
  /subscription-data/{ueId}/v2x-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1v2x-data'
  /subscription-data/{ueId}/pp-profile-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1pp-profile-data'
  /subscription-data/{ueId}/coverage-restriction-data:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1%7BueId%7D~1coverage-
restriction-data'
  /subscription-data/group-data/group-identifiers:
    $ref: 'TS29505_Subscription_Data.yaml#/paths/~1subscription-data~1group-data~1group-identifiers'
  /policy-data/ues/{ueId}/am-data:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1ues~1%7BueId%7D~1am-data'
  /policy-data/ues/{ueId}/ue-policy-set:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1ues~1%7BueId%7D~1ue-policy-set'
  /policy-data/ues/{ueId}/sm-data:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1ues~1%7BueId%7D~1sm-data'
  /policy-data/ues/{ueId}/sm-data/{usageMonId}:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1ues~1%7BueId%7D~1sm-
data~1%7BusageMonId%7D'
  /policy-data/sponsor-connectivity-data/{sponsorId}:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1sponsor-connectivity-
data~1%7BsponsorId%7D'
  /policy-data/bdt-data:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1bdt-data'
  /policy-data/bdt-data/{bdtReferenceId}:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1bdt-data~1%7BbdtReferenceId%7D'
  /policy-data/subs-to-notify:
    $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1subs-to-notify'
```

```
/policy-data/subs-to-notify/{subsId}:
  $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1subs-to-notify~1%7BsubsId%7D'
/policy-data/ues/{ueId}/operator-specific-data:
  $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1ues~1%7BueId%7D~1operator-specific-data'
/application-data/pfds:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1pfds'
/application-data/pfds/{appId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1pfds~1%7BappId%7D'
/application-data/influenceData:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1influenceData'
/application-data/influenceData/{influenceId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-
data~1influenceData~1%7BinfluenceId%7D'
/policy-data/plmns/{plmnId}/ue-policy-set:
  $ref: 'TS29519_Policy_Data.yaml#/paths/~1policy-data~1plmns~1%7BplmnId%7D~1ue-policy-set'
/application-data/bdtPolicyData:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1bdtPolicyData'
/application-data/bdtPolicyData/{bdtPolicyId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-
data~1bdtPolicyData~1%7BbdtPolicyId%7D'
/application-data/iptvConfigData:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1iptvConfigData'
/application-data/iptvConfigData/{configurationId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-
data~1iptvConfigData~1%7BconfigurationId%7D'
/application-data/influenceData/subs-to-notify:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1influenceData~1subs-to-notify'
/application-data/influenceData/subs-to-notify/{subscriptionId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1influenceData~1subs-to-
notify~1%7BsubscriptionId%7D'
/application-data/serviceParamData:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1serviceParamData'
/application-data/serviceParamData/{serviceParamId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-
data~1serviceParamData~1%7BserviceParamId%7D'
/application-data/subs-to-notify:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1subs-to-notify'
/application-data/subs-to-notify/{subsId}:
  $ref: 'TS29519_Application_Data.yaml#/paths/~1application-data~1subs-to-notify~1%7BsubsId%7D'
/exposure-data/{ueId}/access-and-mobility-data:
  $ref: 'TS29519_Exposure_Data.yaml#/paths/~1exposure-data~1%7BueId%7D~1access-and-mobility-data'
/exposure-data/{ueId}/session-management-data/{pduSessionId}:
  $ref: 'TS29519_Exposure_Data.yaml#/paths/~1exposure-data~1%7BueId%7D~1session-management-
data~1%7BpduSessionId%7D'
/exposure-data/subs-to-notify:
  $ref: 'TS29519_Exposure_Data.yaml#/paths/~1exposure-data~1subs-to-notify'
/exposure-data/subs-to-notify/{subId}:
  $ref: 'TS29519_Exposure_Data.yaml#/paths/~1exposure-data~1subs-to-notify~1%7BsubId%7D'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nudr-dr: Access to the Nudr_DataRepository API
            nudr-dr:subscription-data:authentication-subscription:read: Access to read the
AuthenticationSubscription resource of the SubscriptionData data set
            nudr-dr:subscription-data:authentication-subscription:modify: Access to update the
AuthenticationSubscription resource of the SubscriptionData data set
```

A.3   Nudr_GroupIDmap API

```
openapi: 3.0.0

info:
  version: 1.0.0
  title: 'Nudr_GroupIDmap'
  description: |
    Unified Data Repository Service for NF-Group ID retrieval.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
```

```
externalDocs:
  description: 3GPP TS 29.504 V16.4.0; 5G System; Unified Data Repository Services; Stage 3
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.504/'

servers:
  - description: API root
    url: '{apiRoot}/nudr-group-id-map/v1'
    variables:
      apiRoot:
        default: https://example.com

security:
  - {}
  - oAuth2ClientCredentials:
      - nudr-group-id-map

paths:
  /nf-group-ids:
    get:
      summary: Retrieves NF-Group IDs for provided Subscriber and NF types
      operationId: GetNfGroupIDs
      tags:
        - NF Group IDs (Document)
      parameters:
        - name: nf-type
          in: query
          description: Type of NF
          required: true
          style: form
          explode: false
          schema:
            type: array
            items:
              $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/NFType'
            minItems: 1
        - name: subscriberId
          in: query
          description: Identifier of the subscriber
          required: true
          schema:
            $ref: '#/components/schemas/SubscriberId'
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/NfGroupIdMapResult'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        default:
          description: Unexpected error


components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nudr-group-id-map: Access to the Nudr_GroupIDmap API


  schemas:

# COMPLEX TYPES:

    NfGroupIdMapResult:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
      minProperties: 1
```

```
# SIMPLE TYPES:

    SubscriberId:
      type: string
      pattern: '^(imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^@]+@[^@]+|impi-.+|impu-.+|.+)$'

# ENUMS:
```

Annex B (informative):
Change history

						Change history	
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2018-01	CT4#82	C4-181365				TS skeleton	0.0.0
2018-01	CT4#82	C4-181396				Inclusion of pCRs agreed at CT4#82, including C4-181366, C4-181367, C4-181323 and C4-181385.	0.1.0
2018-03	CT4#83	C4-182441				Inclusion of pCRs agreed at CT4#83, including C4-182337, C4-182429.	0.2.0
2018-04	CT4#84	C4-183522				Inclusion of pCRs agreed at CT4#84, including C4-183497, C4-183295, C4-183296, C4-183297, C4-183102, C4-183420, C4-183498.	0.3.0
2018-05	CT4#85	C4-184636				Inclusion of pCRs agreed at CT4#85, including C4-184482, C4-184484, C4-184167, C4-184168, C4-184489, C4-184564, C4-184637.	0.4.0
2018-06	CT#80	CP-181102				Presented for information and approval	1.0.0
2018-06	CT#80					Approved in CT#80.	15.0.0
2018-09	CT#81	CP-182057	0002	1	F	Service Name	15.1.0
2018-09	CT#81	CP-182057	0006	2	F	Supported Features Negotiation	15.1.0
2018-09	CT#81	CP-182057	0004	2	F	Error handling in UDR	15.1.0
2018-09	CT#81	CP-182211	0003	4		OpenAPI file for Nudr_DataRepository API	15.1.0
2018-10	CT#82	CP-183015	0008	-	F	Update the Reference point name	15.2.0
2018-10	CT#82	CP-183015	0009	-	F	Introduction of Barring of Roaming in 5GC	15.2.0
2018-10	CT#82	CP-183015	0010	1	F	Shared Data	15.2.0
2018-10	CT#82	CP-183015	0011	-		Get multiple datasets for ProvsionedData	15.2.0
2018-10	CT#82	CP-183015	0012	1	F	Definition of Authentication Data	15.2.0
2018-12	CT#82	CP-183015	0013	1	F	Adding headers for cache control and conditional request to the Nudr Services API	15.2.0
2018-12	CT#82	CP-183015	0014	-		APIRoot Clarification	15.2.0
2018-12	CT#82	CP-183015	0015	2	F	lifetime of subscription	15.2.0
2018-12	CT#82	CP-183015	0016	1	F	Authorized Event Types	15.2.0
2018-12	CT#82	CP-183015	0017	-		Group Subscription Path	15.2.0
2018-12	CT#82	CP-183177	0018	2	F	PLMN ID as key for UE data sets	15.2.0
2018-12	CT#82	CP-183241	0020	1	F	Correction to Nudr_DataRepository service OpenAPI	15.2.0
2019-03	CT#83	CP-190020	0021	1		CR 0018r2 was not implemented	15.3.0
2019-03	CT#83	CP-190020	0022	2		Corrections on openAPI	15.3.0
2019-03	CT#83	CP-190020	0023			UDR Application Errors	15.3.0
2019-03	CT#83	CP-190020	0025	1		Missing URLs in UDR API	15.3.0
2019-03	CT#83	CP-190172	0026	1		3GPP TS 29.504 API version update	15.3.0
2019-06	CT#84	CP-191031	0027	-	F	Content Type	15.4.0
2019-06	CT#84	CP-191031	0028	-	F	UE Parameter Update (UPU)	15.4.0
2019-06	CT#84	CP-191031	0030	1	F	Group Identifier Translation	15.4.0
2019-06	CT#84	CP-191031	0032	2	F	Storage of OpenAPI specification files	15.4.0
2019-06	CT#84	CP-191031	0034	1	F	Missing Context Path	15.4.0
2019-06	CT#84	CP-191031	0035	-	F	Copyright Note in YAML file	15.4.0
2019-06	CT#84	CP-191031	0038	-	F	3GPP TS 29.504 API version update	15.4.0
2019-06	CT#84	CP-191031	0036	1	F	Resource notification featurres for Policy and Exposure Data	15.4.0
2019-06	CT#84	CP-191048	0037	-	F	3GPP TS 29.504 API version update	16.0.0
2019-06	CT#84	CP-191051	0029	1	B	PFD extension for domain name	16.0.0
2019-09	CT#85	CP-192133	0040	-	B	Closed Access Group	16.1.0
2019-09	CT#85	CP-192133	0041	-	B	VN-Group parameter provisioning	16.1.0
2019-09	CT#85	CP-192123	0042	-	B	Conditional POST / PUT / PATCH / DELETE requests	16.1.0
2019-09	CT#85	CP-192190	0048	1	B	New supported features for xBDT	16.1.0
2019-09	CT#85	CP-192123	0049	1	B	Support a set of MAC addresses in traffic filter	16.1.0
2019-09	CT#85	CP-192123	0050	1	B	Multiple temporal validity conditions for AF traffic influence	16.1.0
2019-09	CT#85	CP-192123	0039	1	B	Network Slicing Subscription Change	16.1.0
2019-09	CT#85	CP-192123	0044	1	F	UDR Application Errors	16.1.0
2019-09	CT#85	CP-192104	0054	1	A	Correction on Feature numbers	16.1.0
2019-09	CT#85	CP-192120	0056	-	F	3GPP TS 29.504 API version update	16.1.0
2019-10	-	-	-	-	-	TS outlook fixed	16.1.1
2019-12	CT#86	CP-193028	0066		A	Wrong YAML Structure of OpenAPI 'info' Clause	16.2.0
2019-12	CT#86	CP-193028	0068		A	CR 0026r1 was not correctly implemented	16.2.0
2019-12	CT#86	CP-193039	0070	1	B	Update Application Data Resources	16.2.0
2019-12	CT#86	CP-193044	0073		F	3GPP TS 29.504 API version update	16.2.0
2019-12	CT#86	CP-193049	0069	1	B	NIDD Authorization Data	16.2.0
2019-12	CT#86	CP-193055	0060	1	B	LCS Private	16.2.0
2019-12	CT#86	CP-193055	0061	1	B	Mobile Originated Data	16.2.0
2019-12	CT#86	CP-193060	0058	1	B	Missed URLLC feature from Application Data	16.2.0
2019-12	CT#86	CP-193063	0059		B	Patch Report Feature	16.2.0
2019-12	CT#86	CP-193063	0057	2	F	Clarification on Implicit Subscriptions to Notifications	16.2.0
2019-12	CT#86	CP-193130	0064	2	B	Nudr_GroupIDmap Service	16.2.0
2019-12	CT#86	CP-193064	0063	1	B	Definition of SessionManagementPolicyDataPatch feature	16.2.0
2020-03	CT#87	CP-200020	0079		B	Mute Notifications	16.3.0

2020-03	CT#87	CP-200039	0074	2	F	Add Corresponding API descriptions in clause 5.1	16.3.0
2020-03	CT#87	CP-200020	0080	1	B	Definition of ConditionalSubscription and NotificationResourceFragment features	16.3.0
2020-03	CT#87	CP-200052	0082		F	3GPP TS 29.504 Rel16 API version and External doc update	16.3.0
2020-03	CT#87	CP-200098	0083		B	Definition of EnhancedInfluDataNotification feature	16.3.0
2020-06	CT#88-e	CP-201046	0084		B	Coverage restriction data resource	16.4.0
2020-06	CT#88-e	CP-201032	0086		B	Location information retrieval for GMLC	16.4.0
2020-06	CT#88-e	CP-201032	0087		B	Resource LcsPrivacySubscriptionData	16.4.0
2020-06	CT#88-e	CP-201071	0088		F	Storage of YAML files in ETSI Forge	16.4.0
2020-06	CT#88-e	CP-201020	0090		A	Definition of OpSpecDataMapNotification feature	16.4.0
2020-06	CT#88-e	CP-201049	0091		B	Correction on V2X Subscription data	16.4.0
2020-06	CT#88-e	CP-201034	0093		F	Cardinality of ProblemDetails	16.4.0
2020-06	CT#88-e	CP-201034	0094		B	Resource Level Authorization	16.4.0
2020-06	CT#88-e	CP-201033	0095		B	Support of SMSoIP	16.4.0
2020-06	CT#88-e	CP-201032	0096		F	Mobile Originated Data retrieval	16.4.0
2020-06	CT#88-e	CP-201034	0097		F	New feature of per UE per serving network authEvent	16.4.0
2020-06	CT#88-e	CP-201073	0098		F	29.504 Rel16 API version and External doc update	16.4.0
2020-09	CT#89-e	CP-202110	0100		F	Scopes for Resource Level Authorization	16.5.0
2020-09	CT#89-e	CP-202112	0104		F	Store Broadcast Location Assistance Data	16.5.0
2020-09	CT#89-e	CP-202110	0105	1	F	Corrections with regard to references	16.5.0
2020-09	CT#89-e	CP-202096	0107		F	API version and External doc update	16.5.0
2020-12	CT#90-e	CP-203049	0110	1	F	HSS can consume UDR services	16.6.0
2020-12	CT#90-e	CP-203042	0112		F	5G VN Groups	16.6.0
2020-12	CT#90-e	CP-203035	0114		F	Storage of YAML files in 3GPP Forge	16.6.0
2020-12	CT#90-e	CP-203036	0118		F	Rel16 API version and External doc update	16.6.0
2021-03	CT#91-e	CP-210043	0121	1	F	Incorrect NfGroupIds definition and missing UDR access paths	16.7.0
2021-03	CT#91-e	CP-210048	0125		F	SMF Events Storage Resource Path	16.7.0
2021-03	CT#91-e	CP-210054	0128		F	29.504 Rel-16 API version and External doc update	16.7.0
2021-06	CT#92-e	CP-211073	0133		F	Subscribed EE profile data for a group	16.8.0
2021-06	CT#92-e	CP-211079	0135		F	Subscribed PP profile data for 5g-VN-group	16.8.0
2021-06	CT#92-e	CP-211079	0137		F	Subscribed PP profile data	16.8.0
2021-06	CT#92-e	CP-211079	0146		F	29.504 Rel-16 API version and External doc update	16.8.0

History

Document history		
V16.4.0	July 2020	Publication
V16.5.0	November 2020	Publication
V16.6.0	January 2021	Publication
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