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Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	5
1 Scope	7
2 References	7
3 Definitions and abbreviations.....	8
3.1 Definitions	8
3.2 Abbreviations	8
4 Overview	8
5 Services offered by the UDR.....	9
5.1 Introduction	9
5.2 Nudr_DataRepository Service.....	9
5.2.1 Service Description.....	9
5.2.1.1 Service and operation description.....	9
5.2.1.2 Service operation and data access authorization	10
5.2.2 Service Operations.....	10
5.2.2.1 Introduction.....	10
5.2.2.2 Query.....	10
5.2.2.2.1 General	10
5.2.2.2.2 Data retrieval	10
5.2.2.2.3 Retrieval of subset of a resource.....	11
5.2.2.3 Create	12
5.2.2.3.1 General	12
5.2.2.3.2 Data Creation using PUT.....	13
5.2.2.3.3 Data Creation using POST	13
5.2.2.4 Delete	14
5.2.2.4.1 General	14
5.2.2.4.2 Deleting Data.....	14
5.2.2.5 Update	14
5.2.2.5.1 General	14
5.2.2.5.2 Data Update using PATCH	14
5.2.2.5.3 Data Update using PUT.....	15
5.2.2.6 Subscribe	15
5.2.2.6.1 General	15
5.2.2.6.2 NF service consumer subscribes to notifications to UDR	15
5.2.2.6.3 Stateless UDM subscribes to notifications to UDR	16
5.2.2.7 Unsubscribe.....	17
5.2.2.7.1 General	17
5.2.2.7.2 Unsubscribe service operation.....	17
5.2.2.8 Notify	18
5.2.2.8.1 General	18
5.2.2.8.2 Notification to NF service consumer on data change	18
5.2.2.8.3 Notification to stateless UDM on data change	18
6 API Definitions	19
6.1 Nudr_DataRepository Service API	19
6.1.1 API URI.....	19
6.1.2 Usage of HTTP.....	19
6.1.2.1 General	19
6.1.2.2 HTTP standard headers	19
6.1.2.2.1 General	19
6.1.2.2.2 Content type	19

6.1.2.2.3	Cache-Control	19
6.1.2.2.4	ETag	20
6.1.2.2.5	If-None-Match	20
6.1.2.2.6	Last-Modified	20
6.1.2.2.7	If-Modified-Since	20
6.1.2.2.8	When to Use Entity-Tags and Last-Modified Dates	20
6.1.2.3	HTTP custom headers	20
6.1.2.3.1	General	20
6.1.2.3.2	3gpp-Sbi-Message-Priority	20
6.1.3	Resources	21
6.1.3.1	Overview	21
6.1.3.2	SubscriptionData	21
6.1.3.3	PolicyData	21
6.1.3.4	StructuredDataForExposure	22
6.1.3.5	ApplicationData	22
6.1.5	Notifications	22
6.1.5.1	General	22
6.1.5.2	Data Change Notification	22
6.1.6	Error Handling	22
6.1.7	Security	23
6.1.8	Feature negotiation	23
Annex A (normative): OpenAPI specification.....		25
A.1	General	25
A.2	Nudr_DataRepository API	25
Annex B (informative): Change history		28
History		29


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[ETSI TS 129 504 V15.9.0 \(2022-01\)](#)

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- 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

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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.

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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".

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.

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

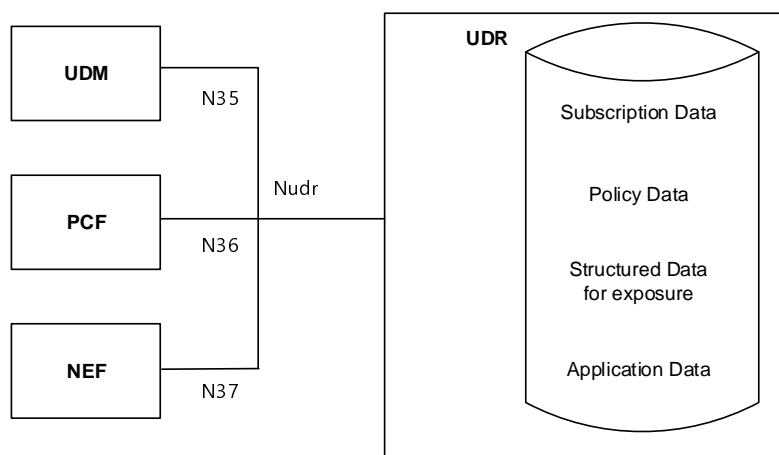


Figure 4-1: Data storage architecture

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

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].

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[4]) 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 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].