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Contents

Foreword

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

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2 presented to TSG for approval;

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

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

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

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

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

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

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

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

can indicates that something is possible

cannot indicates that something is impossible

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

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

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

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

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

In addition:

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

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

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

1 Scope

The present document specifies the stage 3 protocol and data model for the Nudsf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the UDSF.

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

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

2 References

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

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

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

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

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

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

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

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

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

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

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

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

[11] IETF RFC 9113: " HTTP/2".

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

[13] IETF RFC 9457: "Problem Details for HTTP APIs".

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

[15] IETF RFC 9110: "HTTP Semantics".

[16] Void.

[17] IETF RFC 9111: " HTTP Caching".

[18] ISO/IEC 14977: "Information technology – Syntactic metalanguage - Extended BNF".

[19] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[20] IETF RFC 2045: "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".

[21] IETF RFC 2046: "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types".

[22] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

void

3.2 Symbols

void

3.3 Abbreviations

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

5GC	5G Core Network
BNF	Backus–Naur Form
EBNF	Extended BNF
CP	Control Plane
MIME	Multipurpose Internet Mail Extensions
NF	Network Function
UDSF	Unstructured Data Storage Function

4 Overview

The UDSF, as depicted in Figure 4.1-1 below, is described in clause 4.2.5 of 3GPP TS 23.501 [2]. Any of the 5GS NFs can make use of the UDSF to store and retrieve unstructured data, i.e., data that is not defined in 3GPP specifications, and can make use of the UDSF to run timers and get notified on timer expiry. The UDSF is deployed in the same network where the CP NF is located and the same UDSF may be shared by all the NFs in the PLMN to store/retrieve their respective data or an NF may have its own UDSF depending on operator configuration.

NOTE 1: Structured data in this specification refers to data for which the structure is defined in 3GPP specifications. Unstructured data refers to data for which the structure is not defined in 3GPP specifications.

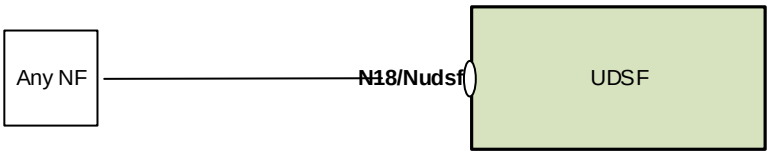

Figure 4.1-1: Reference model – UDSF

5 Services offered by the UDSF

5.1 Introduction

The UDSF offers the following services via the Nudsf service based interface:

- Nudsf_DataRepository Service

NOTE: This service corresponds to the Nudsf_UnstructuredDataManagement service in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

- Nudsf_Timer 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
Nudsf_DataRepository	6.1	UDSF Data Repository Service	TS29598_Nudsf_DataRepository.yaml	nudsf-dr	A.2
Nudsf_Timer	6.2	UDSF Timer Service	TS29598_Nudsf_Timer.yaml	nudsf-timer	A.3

5.2 Nudsf_DataRepository Service

5.2.1 Service Description

The UDSF is acting as an NF Service Producer. It provides UDSF data repository service to the NF service consumer. Any NF may use the UDSF to store unstructured data.

NOTE 1: Structured data in this specification refers to data for which the structure is defined in 3GPP specifications. Unstructured data refers to data for which the structure is not defined in 3GPP specifications.

5.2.2 Service Operations

5.2.2.1 Introduction

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

- Query
- Create
- Update
- Delete
- Notify
- Subscribe
- Unsubscribe

5.2.2.2 Query

5.2.2.2.1 General

The following procedures using the Query service operation are supported:

- Record Retrieval
- Meta Retrieval
- Blocks Retrieval
- Block Retrieval
- Search
- Subscriptions Retrieval
- Individual Subscription Retrieval
- Meta Schema Retrieval

5.2.2.2.2 Record Retrieval

Figure 5.2.2.2.2-1 shows a scenario where the NF service consumer sends a request to the UDSF to retrieve a record that matches the provided recordId and optionally includes the query parameter supported-features.

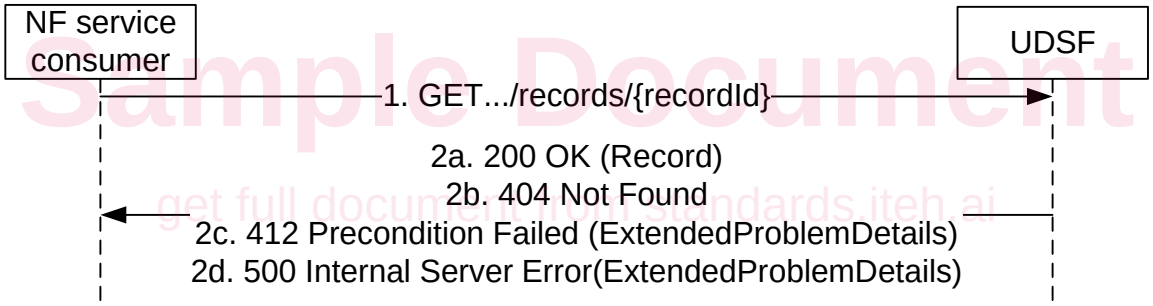

Figure 5.2.2.2.2-1: Requesting a Record

1. The NF service consumer (any NF) sends a GET request to the resource indicated by recordId.

2a. On success, the UDSF responds with "200 OK" with the message body containing the record.

2b. If the record for the given recordId does not exist in the UDSF, the HTTP status code "404 Not Found" shall be returned optionally including additional error information in the response body (in the ProblemDetails element).

2c. If one or more conditions in the given request header fields evaluated to false, the HTTP status code "412 Precondition Failed" shall be returned optionally including additional error information in the response body (in the ExtendedProblemDetails element). The UDSF may include the stored record in the ProblemDetailsExtension.

2d. If the request header fields did not include any preconditions (i.e. "if-*"), the HTTP status code "500 Internal Server Error" may be returned optionally including additional error information in the response body (in the ExtendedProblemDetails element). The UDSF may include the stored record in the ProblemDetailsExtension.

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.2.2.2.3 Meta Retrieval

Figure 5.2.2.2.3-1 shows a scenario where the NF service consumer sends a request to the UDSF to retrieve meta data associated with the provided recordId and optionally includes the query parameter supported-features.

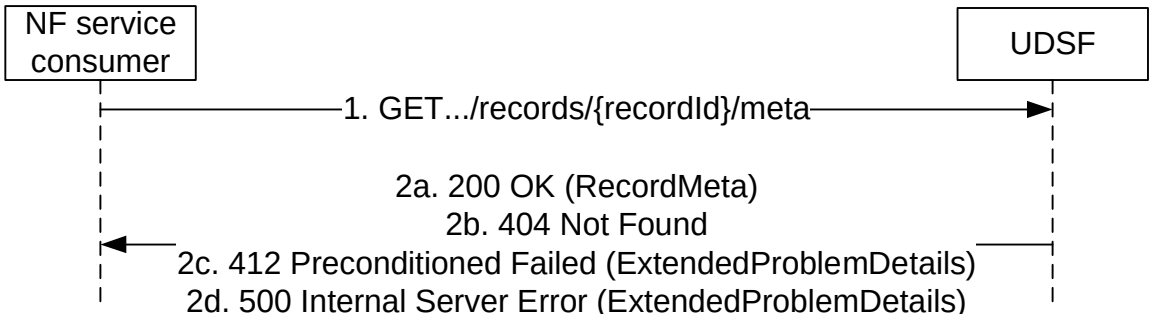

Figure 5.2.2.2.3-1: Requesting Meta for a Record

1. The NF service consumer (any NF) sends a GET request to the meta resource associated with the record indicated by recordId.

2a. On success, the UDSF responds with "200 OK" with the message body containing the RecordMeta.

2b. If the record for the given recordId and thus the RecordMeta does not exist in the UDSF, the HTTP status code "404 Not Found" shall be returned optionally including additional error information in the response body (in the ProblemDetails element).

2c. If one or more conditions in the given request header fields evaluated to false, the HTTP status code "412 Precondition Failed" shall be returned optionally including additional error information in the response body (in the ExtendedProblemDetails element). The UDSF may include the stored record in the ProblemDetailsExtension.

2d. If the request header fields did not include any preconditions (i.e. "if-*"), the HTTP status code "500 Internal Server Error" may be returned optionally including additional error information in the response body (in the ExtendedProblemDetails element). The UDSF may include the stored record in the ProblemDetailsExtension.

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.2.2.2.4 Blocks Retrieval

Figure 5.2.2.2.4-1 shows a scenario where the NF service consumer sends a request to the UDSF to retrieve (all) the blocks associated with the provided recordId and optionally includes the query parameter supported-features.

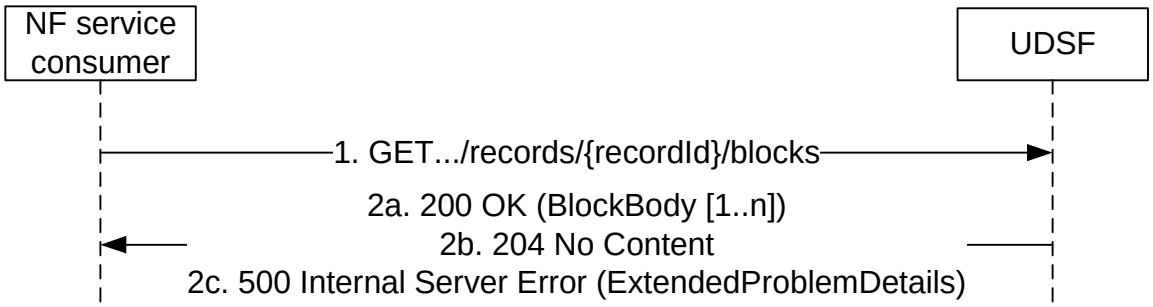

Figure 5.2.2.2.4-1: Requesting Blocks

1. The NF service consumer (any NF) sends a GET request to the resource indicated by recordId.

2a. On success, the UDSF responds with "200 OK" with the message body containing the Blocks associated with the record.

2b. If a Block for the given recordId does not exist in the UDSF, the HTTP status code "204 No Content" shall be returned.

2c. If the request header fields did not include any preconditions (i.e. "if-*"), the HTTP status code "500 Internal Server Error" may be returned optionally including additional error information in the response body (in the ExtendedProblemDetails element). The UDSF may include the stored record in the ProblemDetailsExtension.