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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
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Contents

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

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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

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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.

Introduction

This clause is optional. If it exists, it is always the second unnumbered clause.

1 Scope

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

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3]. The stage 2 definition and procedures of store and retrieve the collected data and analytics are contained in 3GPP TS 23.288 [14] and 3GPP TS 23.502 [3].

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

2 References

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[14] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[15] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[16] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[17] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[19] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[20] 3GPP TS 29.517: "5G System; Application Function Event Exposure Services; Stage 3".

[21] 3GPP TS 29.591: "5G System; Network Exposure Function Southbound Services; Stage 3".

[22] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[23] 3GPP TS 29.574: "5G System; Data Collection Coordination Services; Stage 3".

[24] 3GPP TS 29.576: "5G System; Messaging Framework Adaptor Services; Stage 3".

[25] 3GPP TS 29.536: "5G System; Network Slice Admission Control Services; Stage 3".

3 Definitions, symbols 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].

None.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

None.

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].

ADRF	Analytics Data Repository Function
AF	Application Function
AMF	Access and Mobility Management Function
DCCF	Data Collection Coordination Function
MFAF	Messaging Framework Adaptor Function
NEF	Network Exposure Function
NF	Network Function
NRF	Network Repository Function
NWDAF	Network Data Analytics Function
NSACF	Network Slice Admission Control Function
SMF	Session Management Function
UDM	Unified Data Management

4 Services offered by the ADRF

4.1 Introduction

The Analytics Data Repository Service is used for the Analytics Data Repository Function (ADRF) to storage and retrieval of data by e.g. Consumers NF(s) (e.g. NWDAF) which access the data using Nadrf service. The ADRF offers to other NFs the following service:

- Nadrf_DataManagement.

Table 4.1-1: Service provided by ADRF

Service Name	Description	Service Operations	Operation Semantics	Example Consumer(s)
Nadrf_DataManagement	This service enables the NF service consumers to store, retrieve and remove the data or analytics in an ADRF.	StorageRequest	Request / Response	DCCF, NWDAF, MFAF
		StorageSubscriptionRequest	Request / Response	DCCF, NWDAF
		StorageSubscriptionRemoval	Request / Response	DCCF, NWDAF
		RetrievalRequest	Request / Response	DCCF, NWDAF
		RetrievalSubscribe	Subscribe / Notify	DCCF, NWDAF
		RetrievalUnsubscribe	Subscribe / Notify	DCCF, NWDAF
		RetrievalNotify	Subscribe / Notify	DCCF, NWDAF
		Delete	Request / Response	DCCF, NWDAF
NOTE: The services correspond to the Nadrf_DataManagement service as defined in 3GPP TS 23.288 [14].				

Table 4.1-2 summarizes the corresponding APIs defined for this specification.

Table 4.1-2: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Nadrf_DataManagement	4.2	API for Nadrf_DataManagement		nadrf_datamanagement	Annex A.2 Nadrf_DataManagement API

4.2 Nadrf_DataManagement Service

4.2.1 Service Description

4.2.1.1 Overview

The Nadrf_DataManagement service as defined in 3GPP TS 23.288 [14], is provided by the Analytics Data Repository Function (ADRF).

This service:

- allows NF consumers to store data or analytics in the ADRF;
- allows NF consumers to retrieve data or analytics from an ADRF; and
- allows NF consumers to delete data or analytics from an ADRF.

NOTE: Storage of ML models in ADRF is not specified in this Release of the specification.

4.2.1.2 Service Architecture

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The Network Data Analytics Exposure architecture is defined in 3GPP TS 23.288 [14].

The Nadrf_DataManagement service is part of the Nadrf service-based interface exhibited by the Analytics Data Repository Function (ADRF).

Known consumers of the Nadrf_DataManagement service are:

- Data Collection Coordination Function (DCCF)
- Network Data Analytics Function (NWDAF)
- Messaging Framework Adaptor Function (MFAF)

The Nadrf_DataManagement service is provided by the ADRF and consumed by the NF service consumers as shown in figure 4.2.1.2-1 for the SBI representation model and in figure 4.2.1.2-2 for the reference point representation model.

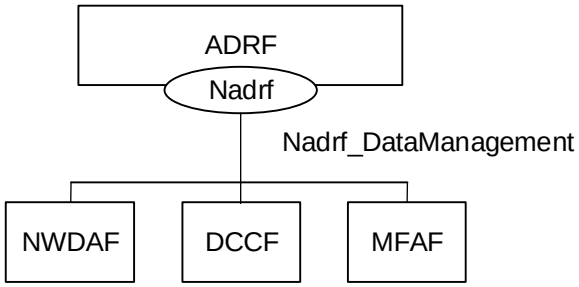

Figure 4.2.1.2-1: Reference Architecture for the Nadrf_DataManagement Service; SBI representation

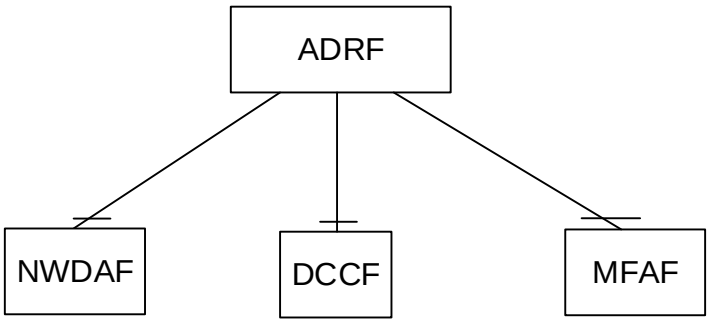

Figure 4.2.1.2-2: Nadrf_DataManagement service architecture, reference point representation

4.2.1.3 Network Functions

4.2.1.3.1 Analytics Data Repository Function (ADRF)

The Analytics Data Repository Function (ADRF) provides the functionality to allow NF consumers to store, retrieve, and remove data or analytics from the ADRF.

4.2.1.3.2 NF Service Consumers

The NWDAF and DCCF:

- supports storing data or analytics in the ADRF;
- supports retrieving data or analytics from an ADRF; and
- supports deletion data or analytics from an ADRF.

The MFAF:

- supports storing data or analytics in the ADRF.

4.2.2 Service Operations

4.2.2.1 Introduction

Table 4.2.2.1-1: Operations of the Nadrf_DataManagement Service

Service operation name	Description	Initiated by
Nadrf_DataManagement_StorageRequest	This service operation is used by an NF to request the ADRF to store data or analytics. Data or analytics are provided to the ADRF in the request message.	NF service consumer (DCCF, NWDAF, MFAF)
Nadrf_DataManagement_StorageSubscriptionRequest	This service operation is used by an NF to request the ADRF to initiate a subscription for data or analytics. Data or analytics provided in notifications as a result of the subsequent subscription by the ADRF are stored in the ADRF.	NF service consumer (DCCF, NWDAF)
Nadrf_DataManagement_StorageSubscriptionRemoval	This service operation is used by an NF to request that the ADRF no longer subscribes to data or analytics it is collecting and storing.	NF service consumer (DCCF, NWDAF)
Nadrf_DataManagement_RetrievalRequest	This service operation is used by an NF to retrieve stored data or analytics from the ADRF.	NF service consumer (DCCF, NWDAF)
Nadrf_DataManagement_RetrievalSubscribe	This service operation is used by an NF to retrieve stored data or analytics from the ADRF and to receive future notifications containing the corresponding data or analytics received by ADRF.	NF service consumer (DCCF, NWDAF)
Nadrf_DataManagement_RetrievalUnsubscribe	This service operation is used by an NF to request that the ADRF no longer sends data or analytics to a notification endpoint.	NF service consumer (DCCF, NWDAF)
Nadrf_DataManagement_RetrievalNotify	This service operation is used by the ADRF to notify an NF with either data or analytics, or instructions to fetch the data or analytics from the ADRF.	ADRF
Nadrf_DataManagement_Delete	This service operation is used by an NF to delete stored data in ADRF.	NF service consumer (DCCF, NWDAF)

4.2.2.2 Nadrf_DataManagement_StorageRequest service operation

4.2.2.2.1 General

The Nadrf_DataManagement_StorageRequest service operation is used by an NF service consumer to store data or analytics.

4.2.2.2.2 Request Storage of data or analytics

Figure 4.2.2.2.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to store data or analytics.

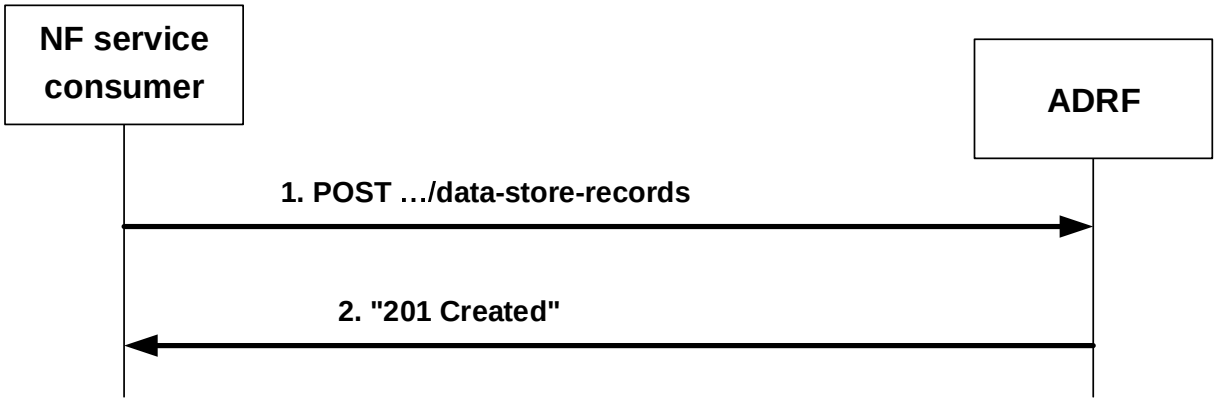

Figure 4.2.2.2.2-1: NF service consumer requesting to store data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_StorageRequest service operation to store data or analytics. The NF service consumer shall send an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records" as Resource URI representing the "ADRF Data Store Records" resource, as shown in figure 4.2.2.2.2-1, step 1, to create an "Individual ADRF Data Store Record" according to the information in the message body. The NadrfDataStoreRecord data structure provided in the request body shall include:

- one of the following:
  - analytics subscription notification(s) within the "anaNotifications" attribute together with the corresponding subscription information within the "anaSub" attribute;
  - data subscription notification within the "dataNotif" attribute together with the corresponding subscription information within the " dataSub" attribute.

Upon the reception of an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records" as Resource URI and NadrfDataStoreRecord data structure as request body, the ADRF shall:

- create a new data store record;
- assign a storeTransId;
- store the data or analytics.

NOTE: If the data and/or analytics is already stored or being stored in the ADRF, the ADRF will still create a new "Individual ADRF Data Store Record" resource and assign a new storeTransId if the ADRF intends to not really store the data again in the memory again based on the implementation.

If the ADRF created an "Individual ADRF Data Store Record" resource, the ADRF shall respond with "201 Created" with the message body containing a representation of the created record, as shown in figure 4.2.2.2.2-1, step 2. The ADRF shall include a Location HTTP header field. The Location header field shall contain the URI of the created record i.e. "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records/{storeTransId}".

If an error occurs when processing the HTTP POST request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

4.2.2.3 Nadrf_DataManagement_StorageSubscriptionRequest service operation

4.2.2.3.1 General

The Nadrf_DataManagement_StorageSubscriptionRequest service operation is used by an NF service consumer to request that the ADRF creates a subscription to data or analytics and subsequently stores notified data or analytics in the ADRF.

4.2.2.3.2 Requesting subscription and storage of data or analytics

Figure 4.2.2.3.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to subscribe for data or analytics to be stored in the ADRF.

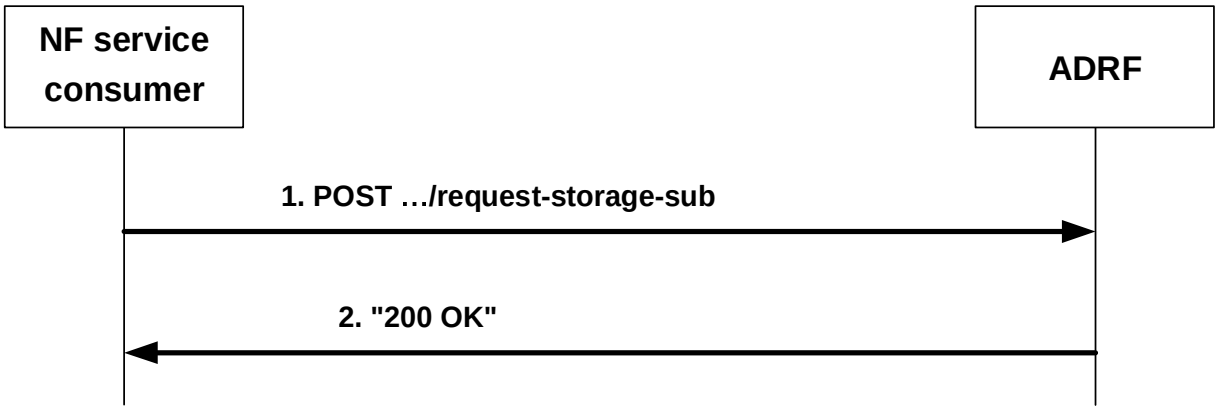

Figure 4.2.2.3.2-1: NF service consumer requesting that the ADRF subscribes to and subsequently stores data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_StorageSubscriptionRequest service operation to request the ADRF to subscribe to data or analytics. The NF service consumer shall send an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/request-storage-sub" as URI, as shown in figure 4.2.2.3.2-1, step 1. The NadrfDataStoreSubscription data structure provided in the request body shall include:

- one of the following subscription attributes:
  - analytics subscription information within the "anaSub" attribute;
  - data subscription information within the "dataSub" attribute;
- one of the following target identifiers:
  - DCCF or NWDAF instance identifier within the "targetNfId" attribute;
  - DCCF or NWDAF NF set identifier within the "targetNfSetId" attribute;

and may include:

- formatting instructions within the "formatInstruct" attribute;
- processing instructions within the "procInstruct" attribute.

Upon the reception of an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/request-storage-sub" as URI and NadrfDataStoreSubscription data structure as request body, the ADRF shall assign a transaction reference identifier to this request and, if the request is successfully processed and accepted, the ADRF shall respond with "200 OK" as shown in figure 4.2.2.3.2-1 step 2, with the message body containing an NadrfDataStoreSubscriptionRef data structure, which shall include the assigned transaction reference identifier as "transRefId" attribute.

NOTE: If the data and/or analytics is already stored or being stored in the ADRF, the ADRF will still assign a new transaction reference identifier if the ADRF intends to not really store the data again in the memory again based on the implementation.

If an error occurs when processing the HTTP POST request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

In the case of a successful response, the ADRF may subsequently create a data or analytics subscription (according to inputs that had been received in the NadrfDataStoreSubscription data structure; this is not performed if the ADRF determines that the data is already being stored based on an existing subscription) with a DCCF as described in 3GPP TS 29.574 [23] or with an NWDAF as described in 3GPP TS 29.520 [15], and create a mapping between the previously assigned and returned transaction reference identifier and the subscription that is used to serve the transaction.

4.2.2.4 Nadrf_DataManagement_StorageSubscriptionRemoval service operation

4.2.2.4.1 General

The Nadrf_DataManagement_StorageSubscriptionRemoval service operation is used by an NF service consumer to request the ADRF to remove a subscription for data or analytics.

4.2.2.4.2 Requesting removal of subscription of data or analytics

Figure 4.2.2.4.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to unsubscribe for storage of data or analytics.

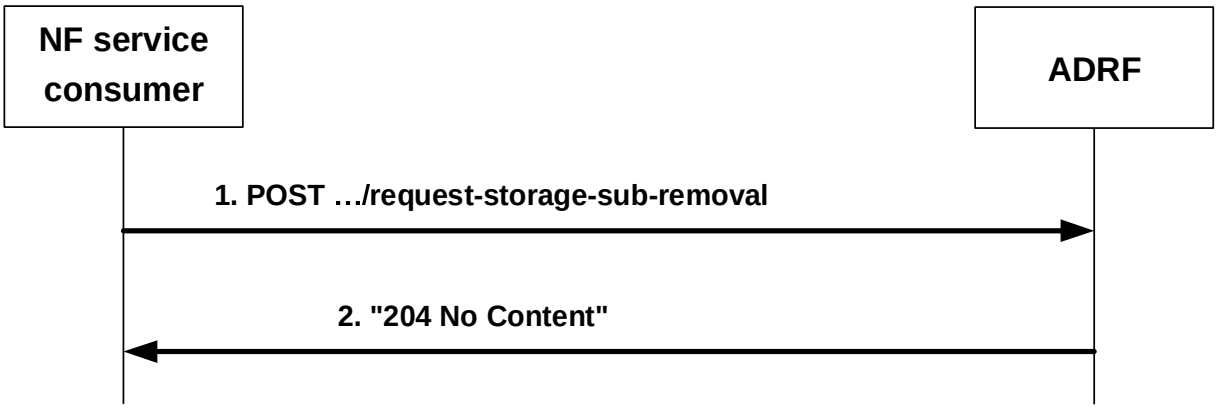

Figure 4.2.2.4.2-1: NF service consumer requesting the removal of a subscription to storage of data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_StorageSubscriptionRemoval service operation to request the ADRF to remove a subscription to data or analytics that are stored in the ADRF. The NF service consumer shall send an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/request-storage-sub-removal" as URI, as shown in figure 4.2.2.4.2-1, step 1. The POST request body shall contain an NadrfDataStoreSubscriptionRef data structure, which shall include a transaction reference identifier as "transRefId" attribute.

Upon the reception of an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/request-storage-sub-removal" as URI, if the ADRF successfully processed and accepted the received HTTP POST request, the ADRF shall respond with HTTP "204 No Content" status. Subsequently, the ADRF shall remove the (DCCF or NWDAF) subscription that had been created and mapped to the received transaction reference identifier as described in clause 4.2.2.3, unless this subscription is mapped to further transaction reference identifiers (of transactions that are still active).

If errors occur when processing the HTTP POST request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

4.2.2.5 Nadrf_DataManagement_RetrievalRequest service operation

4.2.2.5.1 General

The Nadrf_DataManagement_RetrievalRequest service operation is used by an NF service consumer to retrieve stored data or analytics.

4.2.2.5.2 Request and get stored data or analytics from ADRF Data Store

Figure 4.2.2.5.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to retrieve stored data or analytics.

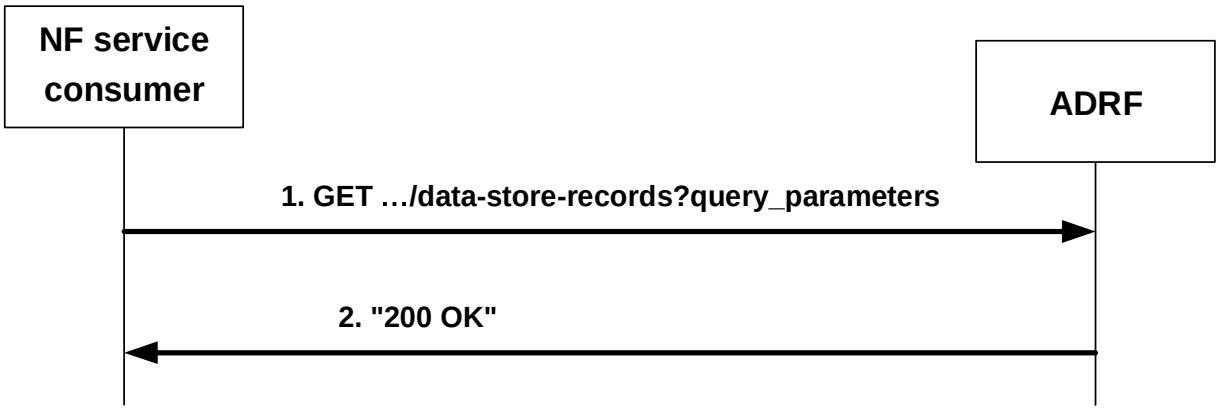

Figure 4.2.2.5.2-1: NF service consumer requesting to retrieve stored data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_RetrievalRequest service operation to retrieve stored data or analytics. The NF service consumer shall send an HTTP GET request with "{apiRoot}/nadrf-datamanagement/v1/data-store-records" as Resource URI representing the "ADRF Data Store Records" resource, as shown in figure 4.2.2.5.2-1, step 1, to request ADRF data store records according to the query parameter value of the store transaction identifier within the "store-trans-id" attribute or the query parameter value of the fetch correlation identifier(s) within the "fetch-correlation-ids" attribute.

Upon the reception of the HTTP GET request, the ADRF shall:

- find the data or analytics according to the requested parameters.

If the requested data or analytics is found, the ADRF shall respond with "200 OK" status code with the message body containing the NadrfDataStoreRecord data structure. The NadrfDataStoreRecord data structure in the response body shall include:

- one of the following:
  - information about network analytics function events that occurred in the "anaNotifications" attribute together with the corresponding subscription information within the "anaSub" attribute;
  - information about data event within the "dataNotif" attribute together with the corresponding subscription information within the "dataSub" attribute.

If the requested analytics or data does not exist, the ADRF shall respond with "204 No Content". If an error occurs when processing the HTTP GET request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

4.2.2.6 Nadrf_DataManagement_RetrievalSubscribe service operation

4.2.2.6.1 General

The Nadrf_DataManagement_RetrievalSubscribe service operation is used by an NF service consumer to subscribe to the ADRF to retrieve via notifications data or analytics that is stored in the ADRF and to receive future notifications with data or analytics when they are received by the ADRF.

4.2.2.6.2 Requesting retrieval and subscription of data or analytics

Figure 4.2.2.6.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to retrieve and subscribe to data or analytics.

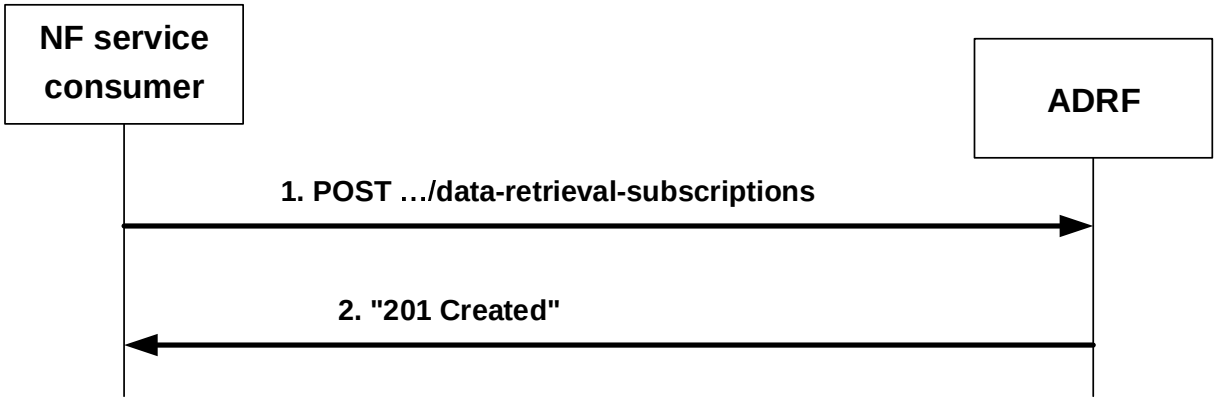

Figure 4.2.2.6.2-1: NF service consumer requesting to retrieve and subscribe to data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_RetrievalSubscribe service operation to retrieve and subscribe to data or analytics. The NF service consumer shall send an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-retrieval-subscriptions" as Resource URI representing the "ADRF Data Retrieval Subscriptions" resource, as shown in figure 4.2.2.6.2-1, step 1, to create an "Individual ADRF Data Retrieval Subscription" according to the information in the message body. The NadrfDataRetrievalSubscription data structure provided in the request body shall include:

- notification correlation identfier within the "notifCorrId" attribute;
- one of the following:
  - analytics subscription information within the "anaSub" attribute;
  - data subscription information within the "dataSub" attribute;
- a notification target address within the "notificationURI" attribute;
- a time window for the data retrieval and subscription within the "timePeriod" attribute;

Upon the reception of an HTTP POST request with "{apiRoot}/nadrf-datamanagement/v1/data-retrieval-subscriptions" as Resource URI and NadrfDataRetrievalSubscription data structure as request body, the ADRF shall:

- create a new subscription;
- assign a subscriptionId;
- store the subscription.

If the ADRF created an "Individual ADRF Data Retrieval Subscription" resource, the ADRF shall respond with "201 Created" with the message body containing a representation of the created subscription, as shown in figure 4.2.2.6.2-1, step 2. The ADRF shall include a Location HTTP header field. The Location header field shall contain the URI of the created record i.e. "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-retrieval-subscriptions/{subscriptionId}".

If an error occurs when processing the HTTP POST request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

4.2.2.7 Nadrf_DataManagement_RetrievalUnsubscribe service operation

4.2.2.7.1 General

The Nadrf_DataManagement_RetrievalUnsubscribe service operation is used by an NF service consumer to remove a retrieval subscription to data or analytics.

4.2.2.7.2 Requesting removal of retrieval subscription for data or analytics

Figure 4.2.2.7.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to remove a retrieval subscription for data or analytics.

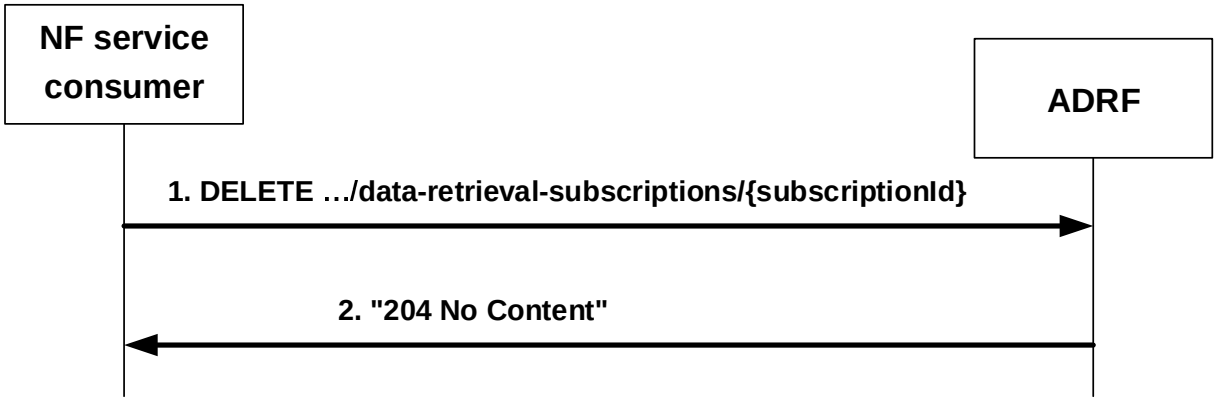

Figure 4.2.2.7.2-1: NF service consumer requesting to remove retrieval subscription for data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_RetrievalUnsubscribe service operation to remove a retrieval subscription for data or analytics. The NF service consumer shall send an HTTP DELETE request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-retrieval-subscriptions/{subscriptionId}" as Resource URI representing an "Individual ADRF Data Retrieval Subscription" resource, as shown in figure 4.2.2.7.2-1, step 1, where "{subscriptionId}" is the identifier of the existing data retrieval subscription that is to be deleted.

Upon the reception of an HTTP DELETE request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-retrieval-subscriptions/{subscriptionId}" as Resource URI, if the ADRF successfully processed and accepted the received HTTP DELETE request, the ADRF shall:

- remove the corresponding subscription;
- respond with HTTP "204 No Content" status.

If errors occur when processing the HTTP DELETE request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

If the ADRF determines the received HTTP DELETE request needs to be redirected, the ADRF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

4.2.2.8 Nadrf_DataManagement_RetrievalNotify service operation

4.2.2.8.1 General

The Nadrf_DataManagement_RetrievalNotify service operation is used by ADRF to notify NF service consumers about subscribed events related to data or analytics.

4.2.2.8.2 Notification about subscribed data or analytics

Figure 4.2.2.8.2-1 shows a scenario where the ADRF sends a request to the NF service consumer to notify it about data or analytics events.

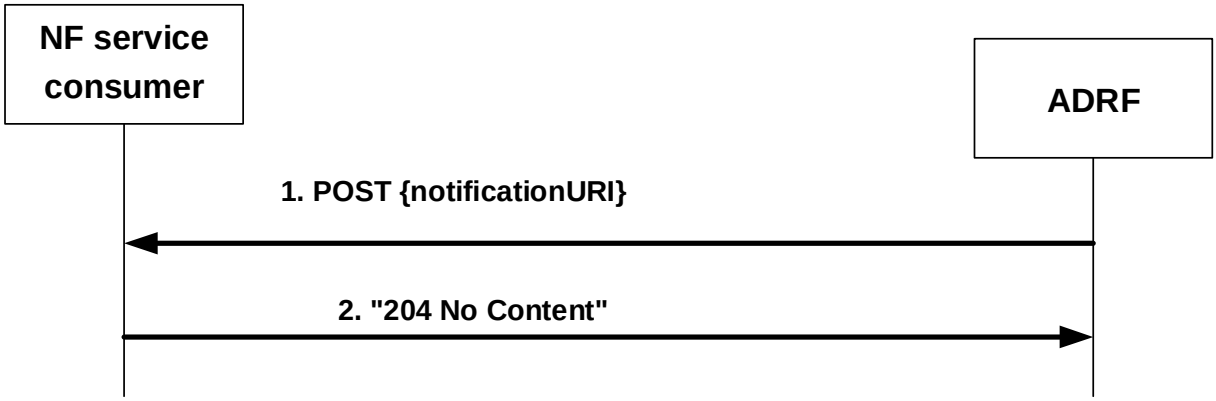

Figure 4.2.2.8.2-1: ADRF notifies the NF service consumer about subscribed data or analytics

The ADRF shall invoke the Nadrf_DataManagement_RetrievalNotify service operation to notify about subscribed data or analytics events. The ADRF shall send an HTTP POST request to the "{notificationURI}" received in the subscription (see clause 5.1.5 for the definition of this notificationURI), as shown in figure 4.2.2.8.2-1, step 1. The NadrfDataRetrievalNotification data structure provided in the request body shall include:

- notification correlation Id within the "notifCorrId" attribute;
- the time stamp which represents the time when ADRF completes preparation of the requested data or analytics within the "timeStamp" attribute;
- one of the following:
  - information about network data analytics function events that occurred in the "anaNotifications" attribute;
  - data collected from data sources (e.g. SMF, NEF) in the "dataNotif" attribute;
  - information for fetching the data or analytics in the "fetchInstruct" attribute.

NOTE: The fetch correlation identifiers included in the fetch instructions of the "fetchInstruct" attribute can be used to fetch data or analytics using the Nadrf_DataManagement_RetrievalRequest service operation as described in clause 4.2.2.5.2. The (mandatory) fetch URI included in the fetch instructions of the "fetchInstruct" attribute is expected to be in line with the standard resource URI defined for the Nadrf_DataManagement_RetrievalRequest service operation, i.e. {apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records, but it can be anything because it is actually not needed by the NF service consumer in this case.

The NadrfDataRetrievalNotification data structure provided in the request body may include:

- a termination request provided by the ADRF within the "terminationReq" attribute.

Upon the reception of an HTTP POST request with "{notificationURI}" as Resource URI and NadrfDataRetrievalNotification data structure as request body, if the NF service consumer successfully processed and accepted the received HTTP POST request, the NF Service Consumer shall:

- store the notification;
- respond with HTTP "204 No Content" status code.

If errors occur when processing the HTTP POST request, the NF service consumer shall send an HTTP error response as specified in clause 5.1.7.

If the NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

4.2.2.9 Nadrf_DataManagement_Delete service operation

4.2.2.9.1 General

The Nadrf_DataManagement_Delete service operation is used by an NF service consumer to delete stored data or analytics.

4.2.2.9.2 Requesting removal of stored data or analytics

Figure 4.2.2.9.2-1 shows a scenario where the NF service consumer sends a request to the ADRF to delete stored data or analytics.

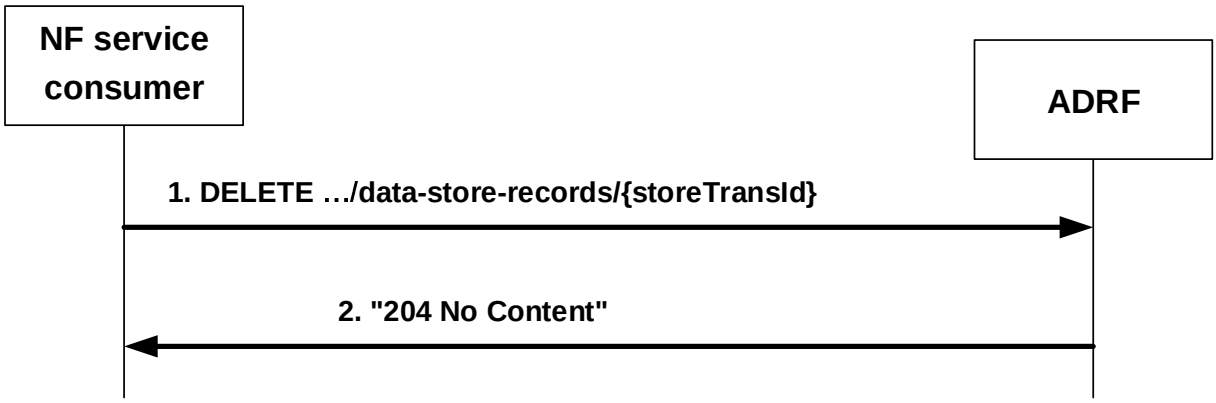

Figure 4.2.2.9.2-1: NF service consumer requesting to remove stored data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_Delete service operation to remove stored data or analytics. The NF service consumer shall send an HTTP DELETE request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records/{storeTransId}" as Resource URI representing an "Individual ADRF Data Store Record" resource, as shown in figure 4.2.2.9.2-1, step 1, where "{storeTransId}" is the transaction identifier of the stored record that is to be deleted.

Upon the reception of an HTTP DELETE request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records/{storeTransId}" as Resource URI, if the ADRF successfully processed and accepted the received HTTP DELETE request, the ADRF shall:

- remove the corresponding stored record;
- respond with HTTP "204 No Content" status code.

If errors occur when processing the HTTP DELETE request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

If the ADRF determines the received HTTP DELETE request needs to be redirected, the ADRF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

4.2.2.9.3 Requesting removal of stored data or analytics using data or analytics specification

Figure 4.2.2.9.3-1 shows a scenario where the NF service consumer sends a request to the ADRF to delete stored data or analytics based on a data or analytics specification.

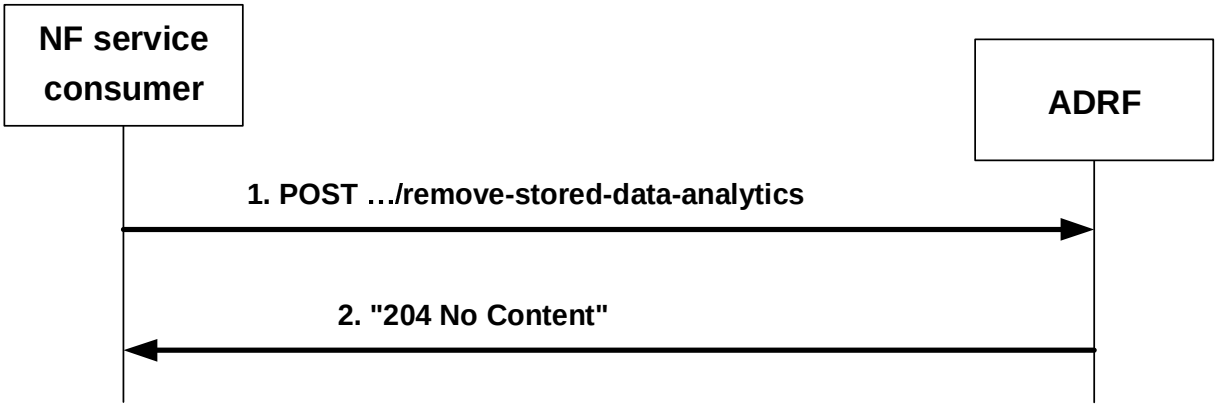

Figure 4.2.2.9.3-1: NF service consumer requesting to remove stored data or analytics

The NF service consumer shall invoke the Nadrf_DataManagement_Delete service operation to remove stored data or analytics based on a data or analytics specification. The NF service consumer shall send an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/remove-stored-data-analytics" as URI, as shown in figure 4.2.2.9.3-1, step 1. The POST request body shall contain an NadrfStoredDataSpec data structure. The NadrfStoredDataSpec data structure provided in the request body shall include:

- a time window in which the data to be deleted was collected in the "timePeriod" attribute; and
- one of the following:
  - a data specification in the "dataSpec" attribute;
  - an analytics specification in the "anaSpec" attribute;

Upon the reception of an HTTP POST request with "{apiRoot}/nadrf-datamanagement/<apiVersion>/remove-stored-data-analytics" as URI, if the ADRF successfully processed and accepted the received HTTP POST request, the ADRF shall respond with HTTP "204 No Content" status. The ADRF shall remove any stored analytics or data that match the analytics or data specification received in the request.

If errors occur when processing the HTTP POST request, the ADRF shall send an HTTP error response as specified in clause 5.1.7.

5 API Definitions

5.1 Nadrf_DataManagement Service API

5.1.1 Introduction

The Nadrf_DataManagement service shall use the Nadrf_DataManagement API.

The API URI of the Nadrf_DataManagement API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].
- The <apiName> shall be "nadrf-datamanagement".

- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 5.1.3.

5.1.2 Usage of HTTP

5.1.2.1 General

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

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

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

5.1.2.2 HTTP standard headers

5.1.2.2.1 General

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

5.1.2.2.2 Content type

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

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

5.1.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be applicable.

5.1.3 Resources

5.1.3.1 Overview

This clause describes the structure for the Resource URIs, the resources and methods used for the service.

Figure 5.1.3.1-1 depicts the resource URIs structure for the Nadrf_DataManagement API.

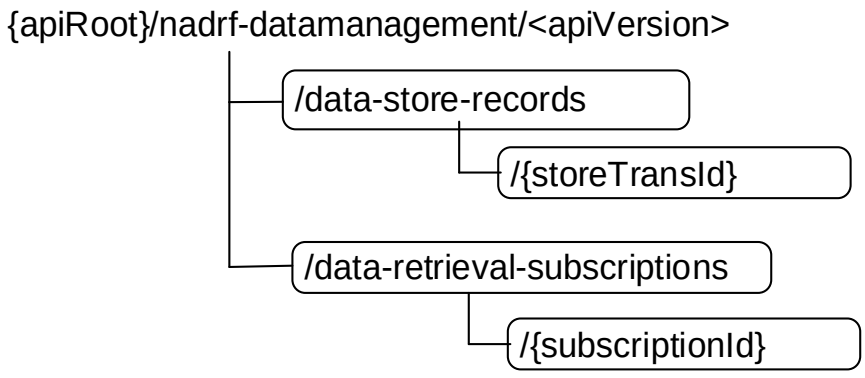

Figure 5.1.3.1-1: Resource URI structure of the Nadrf_DataManagement API

Table 5.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.1.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
ADRF Data Store Records	/data-store-records	GET	Retrieve the stored data or analytics
		POST	Create a new Individual Data Store resource.
Individual ADRF Data Store Record	/data-store-records/{storeTransId}	DELETE	Delete an individual ADRF Data Store Record identified by {storeTransId}.
ADRF Data Retrieval Subscriptions	/data-retrieval-subscriptions	POST	Create a new Individual ADRF Data Retrieval Subscription resource.
Individual ADRF Data Retrieval Subscription	/data-retrieval-subscriptions/{subscriptionId}	DELETE	Delete an individual ADRF Data Retrieval Subscription identified by {subscriptionId}.

5.1.3.2 Resource: ADRF Data Store Records

5.1.3.2.1 Description

The ADRF Data Store Records resource represents all data storage records to the Nadrf_DataManagement Service at a given ADRF. The resource allows an NF service consumer to create a new Individual ADRF Data Store Record resource and to retrieve Individual ADRF Data Store Record resources that fulfil certain criteria.

5.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records**

The <apiVersion> shall be set as described in clause 5.1.1.

This resource shall support the resource URI variables defined in table 5.1.3.2.2-1.

Table 5.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1.1

5.1.3.2.3 Resource Standard Methods

5.1.3.2.3.1 POST

This method shall support the URI query parameters specified in table 5.1.3.2.3.1-1.

Table 5.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.1.3.2.3.1-2 and the response data structures and response codes specified in table 5.1.3.2.3.1-3.

Table 5.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
NadrfDataStoreRecord	M	1	New individual Data Store Record to be created

Table 5.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
NadrfDataStoreRecord	M	1	201 Created	The creation of an Individual Data Store Record resource is confirmed, and a representation of that resource is returned.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.1.7.1-1 of 3GPP TS 29.500 [4] also apply.				

Table 5.1.3.2.3.1-4: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records/{storeTransId}

5.1.3.2.3.2 GET

This method shall support the URI query parameters specified in table 5.1.3.2.3.2-1.

Table 5.1.3.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
store-trans-id	string	O	0..1	Identifies the "Storage Transaction Identifier" of data store record in ADRF. (NOTE)
fetch-correlation-ids	array(string)	O	1..N	Identifies fetch correlation identifiers received as part of fetch instruction. (NOTE)
NOTE: Either "store-trans-id" or "fetch-correlation-ids" shall be provided.				

This method shall support the request data structures specified in table 5.1.3.2.3.1-2 and the response data structures and response codes specified in table 5.1.3.2.3.1-3.

Table 5.1.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.1.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
NadrfDataStoreRecord	M	1	200 OK	Data Store record.
n/a			204 No Content	If the request ADRF Data Store Record does not exist, the ADRF shall respond with "204 No Content ".
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				

5.1.3.2.4 Resource Custom Operations

None.

5.1.3.3 Resource: Individual ADRF Data Store Record

5.1.3.3.1 Description

The Individual ADRF Data Store Record resource represents data or analytics stored via the Nadrf_DataManagement_StorageRequest in ADRF.

5.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records/{storeTransId}**

The <apiVersion> shall be set as described in clause 5.1.1.

This resource shall support the resource URI variables defined in table 5.1.3.3.2-1.

Table 5.1.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1.1.
storeTransId	string	Identifies an individual data store record.

5.1.3.3.3 Resource Standard Methods

5.1.3.3.3.1 DELETE

This method shall support the URI query parameters specified in table 5.1.3.3.3.1-1.

Table 5.1.3.3.3.1-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.1.3.3.3.1-2 and the response data structures and response codes specified in table 5.1.3.3.3.1-3.

Table 5.1.3.3.3.1-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.1.3.3.3.1-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The Individual ADRF Data Store Record resource was deleted successfully.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual ADRF Data Store Record deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADRF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual ADRF Data Store Record deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADRF (service) instance.
NOTE: The manadatory HTTP error status code for the DELETE method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				

Table 5.1.3.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADRF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.1.3.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADRF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.1.3.3.4 Resource Custom Operations

None in this release of the specification.

5.1.3.4 Resource: ADRF Data Retrieval Subscriptions

5.1.3.4.1 Description

The ADRF Data Retrieval Subscriptions resource represents all data retrieval subscriptions to the Nadrf_DataManagement Service at a given ADRF. The resource allows an NF service consumer to create a new Individual ADRF Data Retrieval Subscription resource.

5.1.3.4.2 Resource Definition

Resource URI: **{apiRoot}/nadrf-datamanagement/<apiVersion>/data-retrieval-subscriptions**

The <apiVersion> shall be set as described in clause 5.1.1.

This resource shall support the resource URI variables defined in table 5.1.3.4.2-1.

Table 5.1.3.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1.1

5.1.3.4.3 Resource Standard Methods

5.1.3.4.3.1 POST

This method shall support the URI query parameters specified in table 5.1.3.4.3.1-1.

Table 5.1.3.4.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.1.3.4.3.1-2 and the response data structures and response codes specified in table 5.1.3.4.3.1-3.

Table 5.1.3.4.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
NadrfDataRetrievalSubscription	M	1	Individual ADRF Data Retrieval Subscription resource to be created.

Table 5.1.3.4.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
NadrfDataRetrievalSubscription	M	1	201 Created	The creation of an Individual ADRF Data Retrieval Subscription resource is confirmed and a representation of that resource is returned.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				

Table 5.1.3.4.3.1-4: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nadrf-datamanagement/v1/data-retrieval-subscriptions/{subscriptionId}

5.1.3.4.4 Resource Custom Operations

None in this release of the specification.

5.1.3.5 Resource: Individual ADRF Data Retrieval Subscription

5.1.3.5.1 Description

The Individual ADRF Data Retrieval Subscription resource represents single ADRF data retrieval subscription to the Nadrf_DataManagement Service at a given ADRF. The resource allows an NF service consumer to delete Individual ADRF Data Retrieval Subscription resource.

5.1.3.5.2 Resource Definition

Resource URI: **{apiRoot}/nadrf-datamanagement/v1/data-retrieval-subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 5.1.3.5.2-1.

Table 5.1.3.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1.1
subscriptionId	string	Identifies a subscription to the Nadrf_DataManagement service.

5.1.3.5.3 Resource Standard Methods

5.1.3.5.3.1 DELETE

This method shall support the URI query parameters specified in table 5.1.3.5.3.1-1.

Table 5.1.3.5.3.1-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.1.3.5.3.1-2 and the response data structures and response codes specified in table 5.1.3.5.3.1-3.

Table 5.1.3.5.3.1-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.1.3.5.3.1-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The Individual ADRF Data Retrieval Subscription resource was deleted successfully.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual ADRF Data Retrieval Subscription deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADRF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual ADRF Data Retrieval Subscription deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADRF (service) instance.
NOTE: The manadatory HTTP error status code for the DELETE method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				

Table 5.1.3.5.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADRF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.1.3.5.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADRF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.1.3.5.4 Resource Custom Operations

None in this release of the specification.

5.1.4 Custom Operations without associated resources

5.1.4.1 Overview

The structure of the custom operation URIs of the Nadrf_DataManagement service is shown in Figure 5.1.4.1-1.

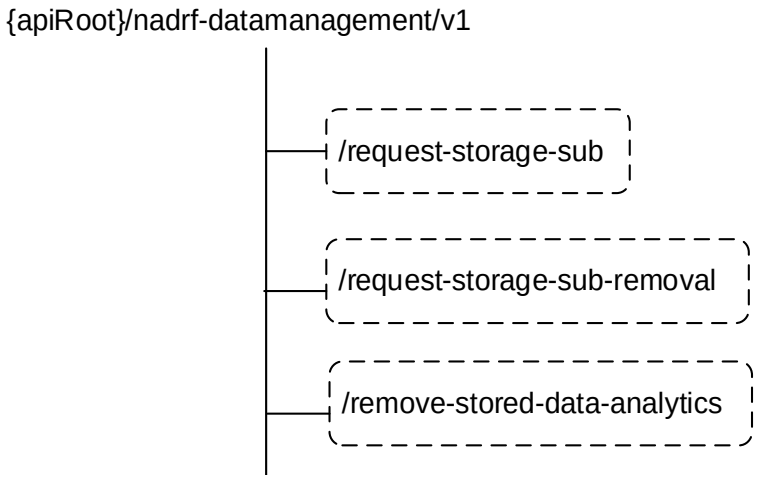

Figure 5.1.4.1-1: Custom operation URI structure of the Nadrf_DataManagement API

Table 5.1.4.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.1.4.1-1: Custom operations without associated resources

Custom operation URI	Mapped HTTP method	Description
{apiRoot}/nadrf-datamanagement/<apiVersion>/request-storage-sub	POST	Request the ADRF to create a subscription for data or analytics and then store the received data or analytics in the ADRF.
{apiRoot}/nadrf-datamanagement/<apiVersion>/request-storage-sub-removal	POST	Request the ADRF to remove a subscription for data or analytics.
{apiRoot}/nadrf-datamanagement/<apiVersion>/remove-stored-data-analytics	POST	Request the ADRF to remove already stored data or analytics.

5.1.4.2 Operation: request-storage-sub

5.1.4.2.1 Description

The operation is used by the NF service consumer to request the ADRF to create a subscription for data or analytics and then store the received data or analytics in the ADRF.

5.1.4.2.2 Operation Definition

This operation shall support the request data structures shown in Table 5.1.4.2.2-1 and the response data structures and error codes specified in Tables 5.1.4.2.2-2.

Table 5.1.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
NadrfDataStoreSubscription	M	1	Information about the storage subscription that the ADRF shall create.

Table 5.1.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
NadrfDataStoreSubscriptionRef	M	1	200 OK	Successful request to trigger the creation of a subscription for data or analytics at the ADRF. A reference is provided.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.1.7.1-1 of 3GPP TS 29.500 [4] also apply.				

5.1.4.3 Operation: request-storage-sub-removal

5.1.4.3.1 Description

The operation is used by the NF service consumer to request the ADRF to remove a subscription for data or analytics which was used to store the received data or analytics in the ADRF.

5.1.4.3.2 Operation Definition

This operation shall support the request data structures shown in Table 5.1.4.3.2-1 and the response data structures and error codes specified in Tables 5.1.4.3.2-2.

Table 5.1.4.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
NadrfDataStoreSubscriptionRef	M	1	Reference used to identify the subscription that the ADRF shall remove.

Table 5.1.4.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful request to trigger the removal of a subscription for data or analytics at the ADRF.
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.1.7.1-1 of 3GPP TS 29.500 [4] also apply.				

5.1.4.4 Operation: remove-stored-data-analytics

5.1.4.4.1 Description

The operation is used by the NF service consumer to request the ADRF to remove stored data or analytics based on a data or analytics specification.

5.1.4.4.2 Operation Definition

This operation shall support the request data structures shown in Table 5.1.4.4.2-1 and the response data structures and error codes specified in Tables 5.1.4.4.2-2.

Table 5.1.4.4.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
NadrfStoredDataSpec	M	1	Information about the specification of data or analytics stored in ADRF.

Table 5.1.4.4.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful request to remove data or analytics at the ADRF based on a data or analytics specification.
NOTE: The mandatory HTTP error status code for the POST method listed in Table 5.1.7.1-1 of 3GPP TS 29.500 [4] also apply.				

5.1.5 Notifications

5.1.5.1 General

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

Table 5.1.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Retrieval Notification	{notificationURI}	POST	Report data or analytics from ADRF.

5.1.5.2 Retrieval Notification

5.1.5.2.1 Description

The Retrieval Notification is used by the NF service producer to report one or several data retrieval events to an NF service consumer that has subscribed to such notifications.

5.1.5.2.2 Target URI

The Callback URI **"{notificationURI}"** shall be used with the callback URI variables defined in table 5.1.5.2.2-1.

Table 5.1.5.2.2-1: Callback URI variables

Name	Definition
notificationURI	String formatted as URI with the Callback Uri

5.1.5.2.3 Standard Methods

5.1.5.2.3.1 POST

This method shall support the request data structures specified in table 5.1.5.2.3.1-1 and the response data structures and response codes specified in table 5.1.5.2.3.1-2.

Table 5.1.5.2.3.1-1: Data structures supported by the POST Request Body

Data type	P	Cardinality	Description
NadrfDataRetrievalNotification	M	1	Provides information about observed data or analytics.

Table 5.1.5.2.3.1-2: Data structures supported by the POST Response Body

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during the retrieval notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during the retrieval notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent.
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				

Table 5.1.5.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected.

Table 5.1.5.2.3.1-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected.

5.1.6 Data Model

5.1.6.1 General

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

Table 5.1.6.1-1 specifies the data types defined for the Nadrf_DataManagement service based interface protocol.

Table 5.1.6.1-1: Nadrf_DataManagement specific Data Types

Data type	Clause defined	Description	Applicability
DataNotification	5.1.6.2.9	Represents a data subscription notification of one of various possible data sources.	
DataSubscription	5.1.6.2.8	Contains information about Data specification.	
NadrfDataRetrievalNotification	5.1.6.2.5	Represents a notification that corresponds with an Individual ADRF Data Retrieval Subscription resource.	
NadrfDataRetrievalSubscription	5.1.6.2.4	Represents an Individual ADRF Data Retrieval Subscription resource.	
NadrfDataStoreRecord	5.1.6.2.2	Represents an Individual ADRF Data Store Record resource.	
NadrfDataStoreSubscription	5.1.6.2.3	Contains information to be used by the ADRF to create a Data or Analytics subscription.	
NadrfDataStoreSubscriptionRef	5.1.6.2.6	Contains a reference to a request for a Data or Analytics subscription.	
NadrfStoredDataSpec	5.1.6.2.7	Contains information about Data or Analytics specification.	

Table 5.1.6.1-2 specifies data types re-used by the Nadrf_DataManagement service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nadrf_DataManagement service based interface.

Table 5.1.6.1-2: Nadrf_DataManagement re-used Data Types

Data type	Reference	Comments	Applicability
AfEventExposureNotif	3GPP TS 29.517 [20]	Represents notifications on AF event(s) that occurred for an Individual AF Event Subscription resource.	
AfEventExposureSubsc	3GPP TS 29.517 [20]	Represents AF event subscription.	
AmfEventNotification	3GPP TS 29.518 [18]	Represents notifications on AMF event(s) that occurred for an Individual AMF Event Subscription resource.	
AmfEventSubscription	3GPP TS 29.518 [18]	Represents AMF event subscription.	
DateTime	3GPP TS 29.571 [16]	Identifies the time.	
EeSubscription	3GPP TS 29.503 [19]	Represents UDM event subscription.	
FetchInstruction	3GPP TS 29.576 [24]	The fetch instruction indicates that the data or analytics can be fetched by the consumer.	
FormattingInstruction	3GPP TS 29.574 [23]	DCCF formatting Instructions.	
MonitoringReport	3GPP TS 29.503 [19]	UDM Monitoring Report.	
NefEventExposureNotif	3GPP TS 29.591 [21]	Represents notifications on network exposure event(s) that occurred for an Individual Network Exposure Event Subscription resource.	
NefEventExposureSubsc	3GPP TS 29.591 [21]	Represents NEF event subscription.	
NfInstanceId	3GPP TS 29.571 [16]	NF instance identifier.	
NfSetId	3GPP TS 29.571 [16]	NF set identifier.	
NnwdafEventsSubscription	3GPP TS 29.520 [15]	Represents an NWDAF analytics subscription.	
NnwdafEventsSubscriptionNotification	3GPP TS 29.520 [15]	Represents an NWDAF analytics subscription notification.	
NotificationData	3GPP TS 29.510 [10]	Represents an NRF event notification.	
NsmfEventExposure	3GPP TS 29.508 [17]	Represents SMF event subscription.	
NsmfEventExposureNotification	3GPP TS 29.508 [17]	Represents SMF event notification.	
ProcessingInstruction	3GPP TS 29.574 [23]	DCCF processing Instructions.	
SACEventReport	3GPP TS 29.536 [25]	Represents an NSACF event notification.	
SACEventSubscription	3GPP TS 29.536 [25]	Represents and NSACF event subscription.	
SubscriptionData	3GPP TS 29.510 [10]	Represents an NRF event subscription.	
TimeWindow	3GPP TS 29.122 [22]	Represents a time window.	
Uri	3GPP TS 29.571 [16]	URI.	

5.1.6.2 Structured data types

5.1.6.2.1 Introduction

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

5.1.6.2.2 Type: NadrfDataStoreRecord

Table 5.1.6.2.2-1: Definition of type NadrfDataStoreRecord

Attribute name	Data type	P	Cardinality	Description	Applicability
dataNotif	DataNotification	C	0..1	Data subscription notification. (NOTE 1)	
anaNotifications	array(NnwdafEventsSubscriptionNotification)	C	1..N	List of analytics subscription notifications. (NOTE 1)	
anaSub	NnwdafEventsSubscription	C	0..1	Represents the subscription information of the corresponding analytics notification. Shall be present if the "anaNotifications" attribute is provided. (NOTE 2)	
dataSub	DataSubscription	C	0..1	Represents the subscription information of the corresponding data notification. Shall be present if the "dataNotif" attribute is provided. (NOTE 2)	
NOTE 1: Exactly one of the attributes "anaNotifications" and "dataNotif" shall be provided. NOTE 2: Exactly one of the attributes "anaSub" and "dataSub" shall be provided.					

5.1.6.2.3 Type: NadrfDataStoreSubscription

Table 5.1.6.2.3-1: Definition of type NadrfDataStoreSubscription

Attribute name	Data type	P	Cardinality	Description	Applicability
anaSub	NnwdafEventsSubscription	C	0..1	Subscribed analytics events. (NOTE 1)	
dataSub	DataSubscription	C	0..1	Represents requested Events subscription. (NOTE 1)	
targetNfId	NfInstanceId	C	0..1	DCCF or NWDAF NF instance identifier to which the ADRF shall create the requested subscription. (NOTE 2)	
targetNfSetId	NfSetId	C	0..1	DCCF or NWDAF NF set identifier to which the ADRF shall create the requested subscription. (NOTE 2)	
formatInstruct	FormattingInstruction	O	0..1	Formatting instructions to be used for sending event notifications.	
procInstruct	ProcessingInstruction	O	0..1	Processing instructions to be used for sending event notifications.	
NOTE 1: Exactly one of these attributes shall be provided. NOTE 2: One of "targetNfId" and "targetNfSetId" shall be provided.					

5.1.6.2.4 Type: NadrfDataRetrievalSubscription

Table 5.1.6.2.4-1: Definition of type NadrfDataRetrievalSubscription

Attribute name	Data type	P	Cardinality	Description	Applicability
anaSub	NnwdafEventsSubscription	C	0..1	Subscribed analytics events. (NOTE 1)	
dataSub	DataSubscription	C	0..1	Represents requested Events subscription. (NOTE 1)	
notificationURI	Uri	M	1	Notification target address. This attribute shall have the same value as the callback URI attribute of the requested subscription attribute.	
timePeriod	TimeWindow	M	1	Represents a start time and a stop time during which the requested data is collected and/or will be collected at the data source.	
notifCorrId	string	M	1	Notification correlation identifier provided by the NF service consumer to be used later by the ADRF in the notifications that correspond with this subscription. The value of this attribute shall be unique per subscription for a given NF service consumer.	
NOTE 1: Exactly one of these attributes shall be provided.					

5.1.6.2.5 Type: NadrfDataRetrievalNotification

Table 5.1.6.2.5-1: Definition of type NadrfDataRetrievalNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
notifCorrId	string	M	1	This attribute indicates the notification correlation identifier provided by the NF service consumer during the data retrieval subscription. This parameter can be useful if the NF service consumer uses a common callback URI for multiple subscriptions.	
anaNotifications	array(NnwdafEventsSubscriptionNotification)	C	1..N	List of analytics subscription notifications. (NOTE)	
dataNotif	DataNotification	C	0..1	Data subscription notification. (NOTE)	
fetchInstruct	FetchInstruction	C	0..1	The fetch instruction indicates that the data or analytics can be fetched by the consumer. (NOTE)	
terminationReq	boolean	O	0..1	If provided and set to "true", it indicates that the subscription is requested to be terminated, i.e. no further notifications related to this subscription will be provided. The default value is "false".	
timeStamp	DateTime	M	1	It represents the time when ADRF completed preparation of the requested data or analytics.	
NOTE: Exactly one of these attributes shall be provided.					

5.1.6.2.6 Type: NadrfDataStoreSubscriptionRef

Table 5.1.6.2.6-1: Definition of type NadrfDataStoreSubscriptionRef

Attribute name	Data type	P	Cardinality	Description	Applicability
transRefId	string	M	1	Transaction reference identifier.	

5.1.6.2.7 Type: NadrfStoredDataSpec

Table 5.1.6.2.7-1: Definition of type NadrfStoredDataSpec

Attribute name	Data type	P	Cardinality	Description	Applicability
dataSpec	DataSubscription	C	0..1	Represents data specification. (NOTE)	
anaSpec	NnwdafEventsSubscription	C	0..1	Represents analytics specification. (NOTE)	
timePeriod	TimeWindow	M	1	Represents a start time and a stop time during which the requested data to be removed was collected at the data source.	
NOTE: Exactly one of these attributes shall be provided.					

5.1.6.2.8 Type: DataSubscription

Table 5.1.6.2.8-1: Definition of type DataSubscription

Attribute name	Data type	P	Cardinality	Description	Applicability
amfDataSub	AmfEventSubscription	C	0..1	Represents requested AMF Events subscription. (NOTE)	
smfDataSub	NsmfEventExposure	C	0..1	Represents requested SMF Events subscription. (NOTE)	
udmDataSub	EeSubscription	C	0..1	Represents requested UDM Events subscription. (NOTE)	
nefDataSub	NefEventExposureSubsc	C	0..1	Represents requested NEF Events subscription. (NOTE)	
afDataSub	AfEventExposureSubsc	C	0..1	Represents requested AF Events subscription. (NOTE)	
nrfDataSub	SubscriptionData	C	0..1	Represents requested NRF Events subscription. (NOTE)	
nsacfDataSub	SACEventSubscription	C	0..1	Represents requested NSACF Events subscription. (NOTE)	
NOTE: Exactly one of these attributes shall be provided.					

5.1.6.2.9 Type: DataNotification

Table 5.1.6.2.9-1: Definition of type DataNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
afEventNotifs	array(AfEventExposureNotif)	C	1..N	List of notifications on AF event(s). (NOTE 1)	
amfEventNotifs	array(AmfEventNotification)	C	1..N	List of notifications on AMF event(s). (NOTE 1)	
smfEventNotifs	array(NsmfEventExposureNotification)	C	1..N	List of notifications on SMF event(s). (NOTE 1)	
udmEventNotifs	array(MonitoringReport)	C	1..N	List of monitoring reports containing information about UDM event(s). (NOTE 1)	
nefEventNotifs	array(NefEventExposureNotif)	C	1..N	List of notifications on network exposure event(s). (NOTE 1)	
nrfEventNotifs	array(NotificationData)	C	1..N	List of notifications on NRF event(s). (NOTE 1)	
nsacfEventNotifs	array(SACEventReport)	C	1..N	List of notifications on NSACF event(s). (NOTE 1)	
timeStamp	DateTime	O	0..1	Indicates the timestamp for the event(s). (NOTE 2)	
NOTE 1: Exactly one of these attributes shall be provided. NOTE 2: The "timeStamp" attribute within the DataNotification data type may be provided if any of the "timeStamp" attribute within AfEventNotification contained in the AfEventExposureNotif, or within AmfEventReport contained in the AmfEventNotification, or within EventNotification contained in the NsmfEventExposureNotification, or within MonitoringReport, or within NefEventNotification contained in the NefEventExposureNotif or within SACEventReportItem contained in the SACEventReport data type is not provided.					

5.1.6.3 Simple data types and enumerations

None.

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

None.

5.1.7 Error Handling

5.1.7.1 General

For the Nadrf_DataManagement API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [5]. Protocol errors and application errors specified in table 5.1.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.1.7.1-1 of 3GPP TS 29.500 [4].

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

5.1.7.2 Protocol Errors

No specific procedures for the Nadrf_DataManagement service are specified.

5.1.7.3 Application Errors

The application errors defined for the Nadrf_DataManagement service are listed in Table 5.1.7.3-1.

Table 5.1.7.3-1: Application errors

Application Error	HTTP status code	Description

5.1.8 Feature negotiation

The optional features in table 5.1.8-1 are defined for the Nadrf_DataManagement API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 5.1.8-1: Supported Features

Feature number	Feature Name	Description

5.1.9 Security

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

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Nadrf_DataManagement API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nadrf_DataManagement service.

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

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the API(s) defined in the present specification. It consists of OpenAPI 3.0.0 specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 1: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see 3GPP TS 29.501 [5] clause 5.3.1 and 3GPP TR 21.900 [7] clause 5B).

A.2 Nadrf_DataManagement API

```
openapi: 3.0.0
info:
  version: 1.0.2
  title: Nadrf_DataManagement
  description: |
    ADRF Data Management Service.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.575 V17.3.0; 5G System; Analytics Data Repository Services; Stage 3.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.575/'
#
servers:
  - url: '{apiRoot}/nadrf-datamanagement/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.
#
security:
  - oAuth2ClientCredentials:
    - nadrf-datamanagement
  - {}
#
paths:
  /data-store-records:
    post:
      summary: Creates a new Individual Data Store Record resource.
      operationId: CreateADRFDataStoreRecord
      tags:
        - ADRF Data Store Records (Collection)
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NadrfDataStoreRecord'
        required: true
        description: ADRF data store record to be stored.
      responses:
        '201':
          description: Successful creation of new Individual ADRF Data Store Record resource.
          headers:
            Location:
              description: >
                Contains the URI of the newly created resource, according to the structure
                {apiRoot}/nadrf-datamanagement/<apiVersion>/data-store-records/{storeTransId}
```

```
            required: true
            schema:
              type: string
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NadrfDataStoreRecord'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  get:
    summary: Retrieves existing Individual ADRF Data Store Records.
    operationId: GetAdrfDataStoreRecords
    tags:
      - ADRF Data Store Records (Collection)
    parameters:
      - name: store-trans-id
        description: A storage transaction identifier of a data store record in ADRF.
        in: query
        required: false
        schema:
          type: string
      - name: fetch-correlation-ids
        description: Fetch correlation identifiers received as part of fetch instruction.
        in: query
        required: false
        style: form
        explode: false
        schema:
          type: array
          items:
            type: string
          minItems: 1
    responses:
      '200':
        description: Data store records are returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NadrfDataStoreRecord'
      '204':
        description: No matching ADRF data were found.
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29571_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
```

```
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /data-store-records/{storeTransId}:
    delete:
      summary: Delete an existing Individual ADRF Data Store Record.
      operationId: DeleteADRFDataStoreRecord
      tags:
        - Individual ADRF Data Store Record (Document)
      parameters:
        - name: storeTransId
          in: path
          description: String identifying a Data Store Record in ADRF.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            No Content. The Individual ADRF Data Store Record resource matching the
            storeTransId was deleted.
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /data-retrieval-subscriptions:
    post:
      summary: Creates a new Individual ADRF Data Retrieval Subscription resource.
      operationId: CreateADRFDataRetrievalSubscription
      tags:
        - ADRF Data Retrieval Subscriptions (Collection)
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NadrfDataRetrievalSubscription'
        required: true
        description: Individual ADRF Data Retrieval Subscription resource to be created.
      responses:
        '201':
          description: Created a new Individual ADRF Data Retrieval Subscription resource.
          headers:
            Location:
              description: >
                Contains the URI of the newly created resource, according to the structure
                {apiRoot}/nadrf-datamanagement/<apiVersion>/data-retrieval-
subscriptions/{subscriptionId}
              required: true
              schema:
                type: string
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/NadrfDataRetrievalSubscription'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
```

```
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      callbacks:
        adrfDataRetrievalNotification:
          '{$request.body#/notificationURI}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/NadrfDataRetrievalNotification'
              responses:
                '204':
                  description: The receipt of the Notification is acknowledged.
                '307':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /data-retrieval-subscriptions/{subscriptionId}:
    delete:
      summary: Delete an existing Individual ADRF Data Retrieval Subscription resource.
      operationId: DeleteADRFDataRetrievalSubscription
      tags:
        - Individual ADRF Data Retrieval Subscription (Document)
      parameters:
        - name: subscriptionId
          in: path
          description: >
            String identifying a data retrieval subscription to the Nadrf_DataManagement
            Service.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            No Content. The Individual ADRF Data Retrieval Subscription resource matching
            the subscriptionId was deleted.
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
```

```
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/request-storage-sub:
  post:
    summary: Triggers the creation of a new ADRF Storage Subscription.
    operationId: CreateADRFStorageSubscription
    tags:
      - ADRF Storage Subscriptions
    requestBody:
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/NadrfDataStoreSubscription'
      required: true
    responses:
      '200':
        description: >
          Successful response with reference used to identify the subscription at the ADRF.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NadrfDataStoreSubscriptionRef'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/request-storage-sub-removal:
  post:
    summary: Triggers the removal of ADRF storage subscription.
    operationId: DeleteADRFStorageSubscription
    tags:
      - ADRF Storage Subscriptions
    requestBody:
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/NadrfDataStoreSubscriptionRef'
      required: true
    responses:
      '204':
        description: >
          No Content. The ADRF Storage Subscription matching the provided reference was deleted.
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
```

```
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /remove-stored-data-analytics:
    post:
      summary: Remove ADRF data based on data or analytics specification.
      operationId: DeleteADRFData
      tags:
        - ADRF Stored Data
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NadrfStoredDataSpec'
        required: true
      responses:
        '204':
          description: No Content. The ADRF data matching the provided specification is deleted.
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
#
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nadrf-datamanagement: Access to the nadrf-datamanagement API
#
  schemas:
#
    NadrfDataStoreRecord:
      description: Represents an Individual ADRF Data Store Record.
      type: object
      oneOf:
        - allOf:
          - required: [anaSub]
          - required: [anaNotifications]
        - allOf:
          - required: [dataSub]
          - required: [dataNotif]
      properties:
        dataNotif:
          $ref: '#/components/schemas/DataNotification'
```

```
        anaNotifications:
          type: array
          items:
            $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NnwdafEventsSubscriptionNotification'
          minItems: 1
          description: List of analytics subscription notifications.
        anaSub:
          type: array
          items:
            $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NnwdafEventsSubscription'
          minItems: 1
          description: >
            Represents the subscription information of the corresponding analytics notification.
        dataSub:
          type: array
          items:
            $ref: '#/components/schemas/DataSubscription'
          minItems: 1
          description: >
            Represents the subscription information of the corresponding data notification.
#
    NadrfDataStoreSubscription:
      description: >
        Contains information to be used by the ADRF to create a Data or Analytics subscription.
      type: object
      allOf:
        - oneOf:
          - required: [anaSub]
          - required: [dataSub]
        - oneOf:
          - required: [targetNfId]
          - required: [targetNfSetId]
      properties:
        anaSub:
          $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NnwdafEventsSubscription'
        dataSub:
          $ref: '#/components/schemas/DataSubscription'
        targetNfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        targetNfSetId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
        formatInstruct:
          $ref: 'TS29574_Ndccf_DataManagement.yaml#/components/schemas/FormattingInstruction'
        procInstruct:
          $ref: 'TS29574_Ndccf_DataManagement.yaml#/components/schemas/ProcessingInstruction'
#
    NadrfDataRetrievalSubscription:
      description: Represents an Individual ADRF Data Retrieval Subscription.
      type: object
      required:
        - notifCorrId
        - notificationURI
        - timePeriod
      oneOf:
        - required: [anaSub]
        - required: [dataSub]
      properties:
        anaSub:
          $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NnwdafEventsSubscription'
        dataSub:
          $ref: '#/components/schemas/DataSubscription'
        notificationURI:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        timePeriod:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        notifCorrId:
          type: string
          description: Notification correlation identifier.
#
    NadrfDataRetrievalNotification:
      description: >
        Represents a notification that corresponds with an Individual ADRF Data
        Retrieval Subscription.
      type: object
```

```
      required:
        - notifCorrId
        - timeStamp
      oneOf:
        - required: [anaNotifications]
        - required: [dataNotif]
        - required: [fetchInstruct]
      properties:
        notifCorrId:
          type: string
          description: Notification correlation identifier.
        anaNotifications:
          type: array
          items:
            $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NnwdafEventsSubscriptionNotification'
          minItems: 1
          description: List of analytics subscription notifications.
        dataNotif:
          $ref: '#/components/schemas/DataNotification'
        fetchInstruct:
          $ref: 'TS29576_Nmfaf_3caDataManagement.yaml#/components/schemas/FetchInstruction'#
        terminationReq:
          type: boolean
          description: >
            It indicates the termination of the data management subscription that requested by the
            ADRF.
        timeStamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
#
    NadrfDataStoreSubscriptionRef:
      description: Contains a reference to a request for a Data or Analytics subscription.
      type: object
      required:
       - transRefId
      properties:
        transRefId:
          type: string
          description: Transaction reference identifier.
#
    NadrfStoredDataSpec:
      description: Contains information about Data or Analytics specification.
      type: object
      required:
       - timePeriod
      oneOf:
        - required: [dataSpec]
        - required: [anaSpec]
      properties:
        dataSpec:
          $ref: '#/components/schemas/DataSubscription'
        anaSpec:
          $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NnwdafEventsSubscription'
        timePeriod:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
#
    DataSubscription:
      description: Contains a data specification.
      type: object
      oneOf:
        - required: [amfDataSub]
        - required: [smfDataSub]
        - required: [udmDataSub]
        - required: [nefDataSub]
        - required: [afDataSub]
        - required: [nrfDataSub]
        - required: [nsacfDataSub]
      properties:
        amfDataSub:
          $ref: 'TS29518_Namf_EventExposure.yaml#/components/schemas/AmfEventSubscription'
        smfDataSub:
          $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/NsmfEventExposure'
        udmDataSub:
          $ref: 'TS29503_Nudm_EE.yaml#/components/schemas/EeSubscription'
        afDataSub:
          $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
        nefDataSub:
```

```
          $ref: 'TS29591_Nnef_EventExposure.yaml#/components/schemas/NefEventExposureSubsc'
        nrfDataSub:
          $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/SubscriptionData'
        nsacfDataSub:
          $ref: 'TS29536_Nnsacf_SliceEventExposure.yaml#/components/schemas/SACEventSubscription'
#
    DataNotification:
      description: Represents a Data Subscription Notification.
      type: object
      oneOf:
        - required: [amfEventNotifs]
        - required: [smfEventNotifs]
        - required: [udmEventNotifs]
        - required: [nefEventNotifs]
        - required: [afEventNotifs]
        - required: [nrfEventNotifs]
        - required: [nsacfEventNotifs]
      properties:
        amfEventNotifs:
          type: array
          items:
            $ref: 'TS29518_Namf_EventExposure.yaml#/components/schemas/AmfEventNotification'
          minItems: 1
          description: List of notifications of AMF events.
        smfEventNotifs:
          type: array
          items:
            $ref:
'TS29508_Nsmf_EventExposure.yaml#/components/schemas/NsmfEventExposureNotification'
          minItems: 1
          description: List of notifications of SMF events.
        udmEventNotifs:
          type: array
          items:
            $ref: 'TS29503_Nudm_EE.yaml#/components/schemas/MonitoringReport'
          minItems: 1
          description: List of notifications of UDM events.
        nefEventNotifs:
          type: array
          items:
            $ref: 'TS29591_Nnef_EventExposure.yaml#/components/schemas/NefEventExposureNotif'
          minItems: 1
          description: List of notifications of NEF events.
        afEventNotifs:
          type: array
          items:
            $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureNotif'
          minItems: 1
          description: List of notifications of AF events.
        nrfEventNotifs:
          type: array
          items:
            $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/NotificationData'
          minItems: 1
          description: List of notifications of NRF events.
        nsacfEventNotifs:
          type: array
          items:
            $ref: 'TS29536_Nnsacf_SliceEventExposure.yaml#/components/schemas/SACEventReport'
          minItems: 1
          description: List of notifications of NSACF events.
        timeStamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'

#
```

Annex B (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2021-06	CT3#116e					TS skeleton of Analytics Data Repository Services specification	0.0.0
2021-06	CT3#116e	C3-213501				Inclusion of documents agreed in CT3#116e C3-213537.	0.1.0
2021-08	CT3#117e	C3-214579				Inclusion of documents agreed in CT3#117e C3-214478.	0.2.0
2021-11	CT3#119e	C3-216521				Inclusion of documents agreed in CT3#119e C3-216443, C3-216455, C3-216456, C3-216457, C3-216458, C3-216459, C3-216460, C3-216462, C3-216469, C3-216591, C3-216592, C3-216593.	0.3.0
2022-01	CT3#119bis-e	C3-220454				Inclusion of documents agreed in CT3#119bis-e C3-220500, C3-220512, C3-220513, C3-220440, C3-220441, C3-220369.	0.4.0
2022-02	CT3#120	C3-221516				Inclusion of documents agreed in CT3#120-e C3-221091, C3-221288, C3-221620, C3-221621.	0.5.0
2022-03	CT#95e	CP-220160				Presentation to TSG CT for approval	1.0.0
2022-03	CT#95e	CP-220160				Approved by TSG CT	17.0.0
2022-06	CT#96	CP-221132	0001	1	F	Adding 3XX response handling support for ADRF services	17.1.0
2022-06	CT#96	CP-221136	0002	3	B	Cleanup of Nadrf_DataManagement data model	17.1.0
2022-06	CT#96	CP-221132	0003	1	F	Corrections in the Nadrf_DataManagement data model	17.1.0
2022-06	CT#96	CP-221129	0004		F	Correct the Cardinality of some attributes	17.1.0
2022-06	CT#96	CP-221134	0005	3	B	Support removal of stored analytics and data from ADRF according to Analytics and Data Specification	17.1.0
2022-06	CT#96	CP-221132	0006	1	B	Support carrying Fetch Instructions in Nadrf_DataManagement_RetrievalNotify service operation	17.1.0
2022-06	CT#96	CP-221133	0008	2	F	Formatting of description fields	17.1.0
2022-06	CT#96	CP-221130	0009		F	Responses on DELETE method	17.1.0
2022-06	CT#96	CP-221133	0011	2	F	Clarification on duplicated data or analytics storage	17.1.0
2022-06	CT#96	CP-221131	0012	1	F	Correction on Nadrf_DataManagement_StorageRequest service operation	17.1.0
2022-06	CT#96	CP-221133	0014		F	Removal of repetitive description in HTTP error response	17.1.0
2022-06	CT#96	CP-221135	0016	1	F	Update inputs of Nadrf_DataManagement_RetrievalNotify service	17.1.0
2022-06	CT#96	CP-221134	0017		F	corrections to Abbreviations and Introduction	17.1.0
2022-06	CT#96	CP-221134	0018		F	correction to time period	17.1.0
2022-06	CT#96	CP-221155	0019	1	F	Update the apiVersion placeholder	17.1.0
2022-06	CT#96	CP-221152	0020		F	Update of info and externalDocs fields	17.1.0
2022-09	CT#97e	CP-222104	0021	1	F	Update inputs of Nadrf_DataManagement_RetrievalNotify service	17.2.0
2022-09	CT#97e	CP-222103	0022	1	F	Corrections in descriptions of the Nadrf_DataManagement_RetrievalRequest operation	17.2.0
2022-09	CT#97e	CP-222103	0023	1	F	ADRF data retrieval notification data model updates	17.2.0
2022-09	CT#97e	CP-222103	0024	1	F	Adding NRF and NSACF as data sources	17.2.0
2022-09	CT#97e	CP-222121	0027		F	Update of info and externalDocs fields	17.2.0
2022-12	CT#98e	CP-223173	0028	1	F	ADRF Retrieval Request inputs	17.3.0
2022-12	CT#98e	CP-223172	0029		F	ADRF Storage Subscription Request handling inconsistencies	17.3.0
2022-12	CT#98e	CP-223173	0035	1	F	The time stamp of data notification	17.3.0
2022-12	CT#98e	CP-223173	0036	1	F	Miscellaneous corrections	17.3.0
2022-12	CT#98e	CP-223192	0038	1	F	Update the apiVersion in the specification	17.3.0
2022-12	CT#98e	CP-223188	0043		F	Update of info and externalDocs fields	17.3.0

History

Document history		
V17.0.0	May 2022	Publication
V17.1.0	July 2022	Publication
V17.2.0	September 2022	Publication
V17.3.0	January 2023	Publication