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# Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

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

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

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

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

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

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

**should** indicates a recommendation to do something

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

**may** indicates permission to do something

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

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

**can** indicates that something is possible

**cannot** indicates that something is impossible

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

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

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

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

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

In addition:

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

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

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

# 1 Scope

The present document specifies the set of APIs and associated resource structures and data models pertaining to the collection and reporting of UE-related data (synonymously “UE data”) by the Data Collection Application Function (AF) in the 5G System for subsequent event exposure services offered to network consumer entities, as defined in 3GPP TS 23.501 [2], TS 23.502 [3], TS 23.288 [4], TS 29.517 [5], TS 29.510 [6] and TS 26.531 [7] .

# 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 (5GS)".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[4] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

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

[6] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[7] 3GPP TS 26.531: "Data Collection and Reporting; General Description and Architecture".

[8] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".

[9] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[10] "CORS (Cross-Origin Resource Sharing)" protocol as defined in the ‘Fetch’ standard of WHATWG: <https://fetch.spec.whatwg.org/#cors-protocol>.

[11] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[12] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[13] 3GPP TS 26.512: “5G Media Streaming (5GMS); Protocols”.

[14] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[15] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

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

[17] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[18] IETF RFC 7540: “Hypertext Transfer Protocol Version 2 (HTTP/2)”.

[19] IETF RFC 7230: “Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing”.

[20] IETF RFC 7231: “Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content”.

[21] IETF RFC 7232: “Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests”.

[22] IETF RFC 7233: “Hypertext Transfer Protocol (HTTP/1.1): Range Requests”.

[23] IETF RFC 7234: “Hypertext Transfer Protocol (HTTP/1.1): Caching”.

[24] IETF RFC 7235: “Hypertext Transfer Protocol (HTTP/1.1): Authentication”.

[25] ISO 8601-1:2019: "Date and time – Representations for information interchange – Part 1: Basic rules".

[26] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1], TS 23.501 [2], TS 23.502 [3], TS 23.288 [4], TS 29.517 [5], TS 29.510 [6], TS 26.531 [7] 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].

**example:** text used to clarify abstract rules by applying them literally.

## 3.2 Symbols

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

Void.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 23.501 [2], TS 23.502 [3], TS 23.288 [4], TS 29.517 [5], TS 29.510 [6], TS 26.531 [7] 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].

AF Application Function

AS Application Server

ASP Application Service Provider

NEF Network Exposure Function

NRF Network Repository Function

NWDAF Network Data Analytics Function

# 4 Procedures for Data Collection and Reporting

## 4.1 General

This clause specifies the stage 3 procedures for data collection and reporting.

## 4.2 Network-side procedures

### 4.2.1 General

This clause specifies the procedures used between network-side entities for UE data collection and reporting, along with related functionality pertaining to the provisioning, management, and delivery of such data between the Data Collection AF and consumer entities.

### 4.2.2 Data Collection AF registration with NRF

This clause specifies the use of the Nnrf\_NFManagement service API as defined in TS 29.510 [7] and invoked by a Data Collection AF instance to register its profile with the NRF in order to enable the discovery of the Data Collection AF by consumer entities.

### 4.2.3 Data collection and reporting provisioning

#### 4.2.3.1 General

An Application Service Provider, via its Provisioing AF, may use the procedures in this clause to supply data collection and reporting provisioning information, as defined in clause 4.2 of TS 26.531 [7], to the Data Collection AF via reference point R1 in the form of Data Reporting Configuration resources. A given Data Reporting Configuration comprises instructions and other information to be followed/used by data collection clients in their collection, processing and reporting of UE data for the associated application service and Event ID(s).

The provisioning process begins with the Provisioning AF using the procedures defined in clause 4.2.3.2 to create a Provisioning Session resource as an umbrella for subsequent Data Reporting Configuration resources.

The process then proceeds with the Provisioning AF using the procedures defined in clause 4.2.3.3 to provide the Data Collection AF with one or more Data Reporting Configuration resources. Each set of provisioning information pertains to one application, identified by its External Application Identifier, and one type of exposed event, uniquely identified in the 5G System by its Event ID, as defined in clause 4.15.1 of TS 23.502 [3].

#### 4.2.3.2 Provisioning Session procedures

##### 4.2.3.2.1 General

Prior to provisioning of data collection and reporting , the Provisioning AF shall create a new Provisioning Session. The following CRUD operations are used to manage Provisioning Session resources. Additional details, including definition of the *Provisioning Sessions API,* are provided under clause 6.2.

##### 4.2.3.2.2 Create Provisioning Session

This procedure shall be used by the Provisioning AF to create a new Provisioning Session. The HTTP POST method shall be used for this purpose.

Editor’s Note: Describe key attributes of the Provisioning Session resource here, especially the access controls that realise the data exposure restrictions affecting all Data Reporting Configuration children of the Provisioning Session.

Upon successful creation, the Data Collection AF shall respond with a 201 (Created) response message that includes the resource identifier of the newly created Provisioning Session in the body of the reply and the URL of the resource, including its resource identifier, shall be returned as part of the HTTP Location header field.

##### 4.2.3.2.3 Retrieve Provisioning Session properties

This procedure is used by the Provisioning AF to obtain the properties of an existing Provisioning Session from the Data Collection AF. The HTTP GET method shall be used for this purpose.

##### 4.2.3.2.4 Update Provisioning Session properties

The Update operation is not allowed on Provisioning Session resources.

##### 4.2.3.2.5 Destroy Provisioning Session

This procedure is used by the Provisioning AF to destroy a Provisioning Session. The Data Collection AF shall use the HTTP DELETE method for this purpose.

As a side-effect of destroying a Provisioning Session, the Data Collection AF shall release any associated resources, purge any cached data, and delete all UE data reporting configurations associated with this Provisioning Session.

#### 4.2.3.3 Data Reporting Configuration procedures

##### 4.2.3.3.1 General

Upon the successful creation of a Provisioning Session, the Provisioning AF shall use the procedures defined in this clause to configure UE data collection and reporting functionality specific to an application in the Data Collection AF. This clause defines the basic procedures. Additional details, including definition of the *Data Reporting* *Configuration API* are provided under clause 6.3.

##### 4.2.3.3.2 Data Reporting Configuration

A given instance of a Data Reporting Configuration resource is identified by the dataReportingConfigurationId property of the DataReportingConfiguration resource, and applies to one type of data collection client. The properties of this resource, as defined in the following clauses, pertain to UE data collection and reporting by different data collection clients to the Data Collection AF, and control of access by different consumer entities to event data exposed by the Data Collection AF.

The type of a Data Reporting Configuration resource is identified by the dataCollectionClientType property of the DataReportingConfiguration resource as specified in clause 6.3.3.1.

NOTE 1: The *dataCollectionClientType* property corresponds to the *Data collection client type* parameter in table 4.6.2-1 of TS 26.531 [7].

The Data Reporting Configuration resource may contain one or more sets of data exposure restrictions, expressed as Data Access Profiles (see clause 6.3.3.2), each one determining the level of access to the collected event data. A Data Access Profile defines the granularity of access to a particular subset of collected event data parameters for the Event ID in question. This granularity is expressed as a set of data aggregation functions along the time, user, and location dimensions. An authorization procedure is in place to determine which Data Access Profile is granted to a particular event consumer entity.

NOTE 2: The process of matching event consumers to Data Access Profiles is implementation-specific and therefore beyond the scope of the present document.

##### 4.2.3.3.3 Create Data Reporting Configuration

This procedure is used by the Provisioning AF to create a Data Reporting Configuration resource within the scope of a particular Provisioning Session. The HTTP POST method shall be used for this purpose and the request message body may include a DataReportingConfiguration resource, as specified under clause 6.3.

Upon success, the Data Collection AF shall respond with a 201 (Created) response message and the resource URL for the newly-created Data Reporting Configuration resource shall be returned in the Location header field.

If the procedure is unsuccessful, the Data Collection AF shall provide a response code as defined in clause 5.3.

This procedure may be performed multiple times to provision different Data Reporting Configurations in the scope of a particular Provisioning Session.

##### 4.2.3.3.4 Retrieve Data Reporting Configuration

This procedure is used by the Provisioning AF to obtain the properties of an existing Data Reporting Configuration resource from the Data Collection AF. The HTTP GET method shall be used for this purpose.

If successful, the Data Collection AF shall respond with a 200 (OK) and the requested DataReportingConfiguration resource shall be returned in the body of the HTTP response message.

If the procedure is unsuccessful, the Data Collection AF shall provide a response code as defined in clause 5.3.

##### 4.2.3.3.5 Update Data Reporting Configuration

The update operation is invoked by the Provisioning AF to initially upload the representation of a Data Reporting Configuration resource created using the procedure in clause 4.2.3.3.3 or, in the case of an existing Data Reporting Configuration resource, to entirely replace or modify certain properties of that resource. All available properties may be updated. The HTTP PATCH or HTTP PUT methods shall be used for the update operation.

If the procedure is successful, the Data Collection AF shall respond with a 200 (OK) reflecting the successful update operation.

If the procedure is unsuccessful, the Data Collection AF shall provide a response code as defined in clause 5.3.

##### 4.2.3.3.6 Destroy Data Reporting Configuration

This operation is used by the Provisioning AF to destroy a Data Reporting Configuration resource and to terminate the related UE data reporting procedure. The HTTP DELETE method shall be used for this purpose.

As a result, the Data Collection AF should release any associated resources, deliver any pending data to subscribed recipients, as appropriate to the Event ID in question, and delete any corresponding configurations.

If the procedure is successful, the Data Collection AF shall respond with a 200 (OK) response message.

If the procedure is unsuccessful, the Data Collection AF shall provide a response code as defined in clause 5.3.

### 4.2.4 Configuration of Indirect Data Collection Client

#### 4.2.4.1 General

Indirect reporting operation involves first a UE Application instance sending domain-specific UE data to an Application Service Provider (ASP) server instance across reference point R8. That UE data is passed from to an Indirect Data Collection Client function operated by the Application Service Provider to be subsequently sent as data reports, possibly in processed form, to a Data Collection AF instance. Operation of the latter procedure is conditioned upon the Indirect Data Collection Client having acquired its data collection and reporting configuration from the Data Collection AF by means of the Ndcaf\_DataReporting service (either directly across the reference point R3 or via an equivalent service exposed by the NEF, depending on whether the Indirect Data Collection Client and the Data Collection AF reside in the same or separate trust domains).

The Indirect Data Collection Client shall obtain its configuration by invoking the Data Collection and Reporting Configuration API associated with the Ndcaf\_DataReporting service, as described under clause 7.2.

The configuration information is contained in a generic data collection and reporting configuration envelope that shall include at minimum the baseline configuration parameters defined in clause 4.6.3 of TS 26.531 [7]. In particular, the configuration shall specify the domain-specific parameters associated with the specified Event ID(s) to be reported to the Data Collection AF.

#### 4.2.4.2 Indirect Data Collection Client retrieves its initial configuration by creating a Data Reporting Session

The call flow in figure 4.2.4.2‑1 shows the interaction between the Indirect Data Collection Client and the Data Collection AF at the initial configuration of the Indirect Data Collection Client.

****

**Figure 4.2.4.2-1: Initial configuration of Indirect Data Collection Client**

The steps in this procedure are as follows:

1. The Indirect Data Collection Client invokes the *Ndcaf\_DataReporting\_CreateSession* service operation by sending an HTTP POST request to the Data Collection AF (see clauses 7.2.2.1 and 7.2.2.2.3.1). A *DataReportingSession* resource entity (see clause 7.2.3.2.1) is included in the request message body, but only properties *externalApplicationId* and *supportedDomains* are present (because the other properties are unknown to the Indirect Data Collection Client).

2. In its *201 Created* response, the Data Collection AF provides a *DataReportingSession* resource entity in the message body, which expands the content of the request message body in step 1 by adding the properties *sessionId*, *validUntil*, *reportForDomains* and *reportingCondition*. The *validUntil* property of the provided *DataReportingSession* should be a time in the future.

The Indirect Data Collection Client is now configured.

#### 4.2.4.3 Updating and renewing data collection and reporting configuration

##### 4.2.4.3.1 Introduction

The data collection and reporting configuration may change as a result of subscriptions to events exposed by the Data Collection AF. There are two ways the data collection and reporting configuration can be updated or renewed by the Indirect Data Collection Client:

1. The Indirect Data Collection Client invokes the *Ndcaf\_DataReporting\_RetrieveSession* service operation (see clause 4.2.4.3.2).

2. The Data Collection AF supplies a *DataReportingSession* in response to a data report submitted by the Indirect Data Collection Client (see clause 4.2.4.3.3).

##### 4.2.4.3.2 Indirect Data Collection Client retrieves up-to-date configuration

This operation is typically performed when the *validUntil* property of the current *DataReportingSession* stored in the Indirect Data Collection Client is about to expire.



**Figure 4.2.4.3.2-1: Indirect Data Collection Client retrieves up-to-date DataReportingSession**

The steps in this procedure are as follows:

1. The Indirect Data Collection Client requests the *DataReportingSession* for the current session by using the *Ndcaf\_DataReporting \_RetreiveSession* service operation (see clauses 7.2.2.1 and 7.2.2.3.3.1).

2. The Data Collection AF provides the latest *DataReportingSession* in the message body of a *200 OK* response. The *validUntil* property of the provided *DataReportingSession* should be a time in the future. In addition, the Data Collection AF may change properties *reportForDomains* and *reportingCondition*.

##### 4.2.4.3.3 DataReportingSession updated in response to data reporting

See clause 4.2.6.

#### 4.2.4.4 Indirect Data Collection Client destroys Data Reporting Session

The Indirect Data Collection Client may destroy a Data Reporting Session and the data collection and reporting configuration it represents by invoking the *Ndcaf\_DataReporting\_DestroySession* service operation.



**Figure 4.2.4.4-1: Indirect Data Collection Client destroys DataReportingSession**

The steps in this procedure are as follows:

1. The Indirect Data Collection Client invokes the *Ndcaf\_DataReporting\_DestroySession* service operation by sending an HTTP DELETE request to the Data Collection AF (see clauses 7.2.2.1 and 7.2.2.3.3.2).

2. The Data Collection AF acknowledges the destruction of the session and its configuration with a *204 No Content* response.

### 4.2.5 Configuration of Application Server

#### 4.2.5.1 General

An Application Server (AS) instance, as a type of data collection client, acquires its domain-specific data collection and reporting configuration from a Data Collection AF instance by means of the Ndcaf\_DataReporting service (either directly across reference point R4 or via an equivalent service exposed by the NEF, depending on whether the AS and the Data Collection AF reside in the same or separate trust domains).

Similar to clause 4.2.4, the AS shall obtain its configuration by invoking the *Data Collection and Reporting Configuration API* associated with the Ndcaf\_DataReporting service, as described under clause 7.2.

The configuration information is contained in a generic data collection and reporting configuration envelope that shall include at minimum the baseline configuration parameters defined in clause 4.6.3 of TS 26.531 [7]. The configuration shall specify the domain-specific parameters associated with the specified Event ID(s) to be reported to the Data Collection AF.

#### 4.2.5.2 Application Server retrieves its initial configuration by creating a Data Reporting Session

The call flow in figure 4.2.5.2‑1 shows the interaction between the Application Server and the Data Collection AF at the initial configuration of the Application Server.

****

**Figure 4.2.5.2-1: Initial configuration of Application Server**

The steps in this procedure are as follows:

1. The Application Server invokes the *Ndcaf\_DataReporting\_CreateSession* service operation by sending an HTTP POST request to the Data Collection AF (see clauses 7.2.2.1 and 7.2.2.2.3.1). A *DataReportingSession* resource entity (see clause 7.2.3.2.1) is included in the request message body, but only properties *externalApplicationId* and *supportedDomains* are present (because the other properties are unknown to the Application Server).

2. In its *201 Created* response, the Data Collection AF provides a *DataReportingSession* resource entity in the message body, which expands the content of the request message body in step 1 by adding the properties *sessionId*, *validUntil*, *reportForDomains* and *reportingCondition*. The *validUntil* property of the provided *DataReportingSession* should be a time in the future.

The Application Server is now configured.

#### 4.2.5.3 Updating and renewing data collection and reporting configuration

##### 4.2.5.3.1 Introduction

The data collection and reporting configuration may change as a result of subscriptions to events exposed by the Data Collection AF. There are two ways the data collection and reporting configuration can be updated or renewed by the Application Server:

1. The Application Server invokes the *Ndcaf\_DataReporting\_RetrieveSession* service operation (see clause 4.2.5.3.2).

2. The Data Collection AF supplies a *DataReportingSession* in response to a data report submitted by the Application Server (see clause 4.2.5.3.3).

##### 4.2.5.3.2 Application Server retrieves up-to-date configuration

This operation is typically performed when the *validUntil* property of the current *DataReportingSession* stored in the Application Server is about to expire.



**Figure 4.2.5.3.2-1: Application Server retrieves up-to-date DataReportingSession**

The steps in this procedure are as follows:

1. The Application Server requests the *DataReportingSession* for the current session by using the *Ndcaf\_DataReporting \_RetreiveSession* service operation (see clauses 7.2.2.1 and 7.2.2.3.3.1).

2. The Data Collection AF provides the latest *DataReportingSession* in the message body of a *200 OK* response. The *validUntil* property of the provided *DataReportingSession* should be a time in the future. In addition, the Data Collection AF may change properties *reportForDomains* and *reportingCondition*.

##### 4.2.5.3.3 DataReportingSession updated in response to data reporting

See clause 4.2.7.

#### 4.2.5.4 Application Server destroys Data Reporting Session

The Application Server may destroy a Data Reporting Session and the data collection and reporting configuration it represents by invoking the *Ndcaf\_DataReporting\_DestroySession* service operation.



**Figure 4.2.5.4-1: Application Server destroys DataReportingSession**

The steps in this procedure are as follows:

1. The Application Server invokes the *Ndcaf\_DataReporting\_DestroySession* service operation by sending an HTTP DELETE request to the Data Collection AF (see clauses 7.2.2.1 and 7.2.2.3.3.2).

2. The Data Collection AF acknowledges the destruction of the session and its configuration with a *204 No Content* response.

### 4.2.6 Indirect data reporting

After acquiring its data collection and configuration from the Data Collection AF, and in accordance with this configuration, the Indirect Data Collection Client shall send reporting domain-specific data reports to the Data Collection AF by invoking the *Data Reporting API* associated with *Ndcaf\_DataReporting* service across reference point R3 as described under clause 7.3. The data reports shall be supplied in a generic data report envelope that includes at minimum the baseline information for data reporting defined in clause 4.6.4 of TS 26.531 [7].

The call flow in figure 4.2.6‑1 shows the procedure for indirect data reporting.

NOTE: It is assumed that the Indirect Data Collection Client is already configured per the procedures specified in clause 4.2.4.



**Figure 4.2.6-1: Indirect data reporting**

1. When the *reportCondition* of a *DataReportingSession* is fulfilled, the Indirect Data Collection Client invokes the *Ndcaf\_DataReporting\_Report* service operation (see clauses 7.3.2.1 and 7.3.2.2.3.1) by issuing an HTTP POST request to the Data Collection AF. The request message body is a *DataReport* (see clause 7.3.3.2.1).

2. In the HTTP response the Data Collection AF may provide an up-to-date *DataReportingSession*. The Indirect Data Collection Client shall take note of any changes and act accordingly.

### 4.2.7 Reporting by Application Server

After acquiring its data collection and configuration from the Data Collection AF, and in accordance with this configuration, the Application Server shall send reporting domain-specific data reports to the Data Collection AF by invoking the *Data Reporting API* associated with *Ndcaf\_DataReporting* service across reference point R4 as described under clause 7.3. The data reports shall be supplied in a generic data report envelope that includes at minimum the baseline information for data reporting defined in clause 4.6.4 of TS 26.531 [7].

The call flow in figure 4.2.7‑1 shows the procedure for data reporting by the Application Server.

NOTE: It is assumed that the Application Server is already configured per the procedures specified in clause 4.2.5.



**Figure 4.2.7-1: Data reporting by Application Server**

1. When the *reportCondition* of a *DataReportingSession* is fulfilled, the Application Server invokes the *Ndcaf\_DataReporting\_Report* service operation (see clauses 7.3.2.1 and 7.3.2.2.3.1) by issuing an HTTP POST request to the Data Collection AF. The request message body is a *DataReport* (see clause 7.3.3.2.1).

2. In the HTTP response the Data Collection AF may provide an up-to-date *DataReportingSession*. The Application Server shall take note of any changes and act accordingly.

### 4.2.8 Event subscription, management and publication

This clause pertains to the use of the *Naf\_EventExposure* service API as defined in TS 29.517 [5] and invoked by the NWDAF or an Application Server Provider AF to subscribe to and receive UE data related event information from a Data Collection AF.

## 4.3 UE-to-network procedures

### 4.3.1 General

This clause specifies the procedures used between the UE and Network Functions in support of provisioning a data collection and reporting configuration in the UE’s Direct Data Collection Client, and subsequent reporting of the collected UE data to the Data Collection AF.

### 4.3.2 Configuration of Direct Data Collection Client

#### 4.3.2.1 General

A Direct Data Collection Client instance acquires its domain-specific data collection and reporting configuration from a Data Collection AF instance by means of the Ndcaf\_DataReporting service across reference point R2.

The Direct Data Collection Client shall obtain its configuration by invoking the *Data Collection and Reporting Configuration API* associated with the Ndcaf\_DataReporting service, as described under clause 7.2.

The configuration information is contained in a generic data collection and reporting configuration envelope that shall include at minimum the baseline configuration parameters defined in clause 4.6.3 of TS 26.531 [7]. The configuration shall specify the domain-specific parameters associated with the specified Event ID(s) to be reported to the Data Collection AF.

#### 4.3.2.2 Direct Data Collection Client retrieves its initial configuration by creating a Data Reporting Session

The call flow in figure 4.3.2.2‑1 shows the interaction between the Direct Data Collection Client and the Data Collection AF at the initial configuration of the Direct Data Collection Client.



Figure 4.3.2.2-1: Initial configuration of Direct Data Collection Client

The steps in this procedure are as follows:

1. The Direct Data Collection Client invokes the Ndcaf\_DataReporting\_CreateSession service operation by sending an HTTP POST request to the Data Collection AF (see clauses 7.2.2.1 and 7.2.2.2.3.1). A DataReportingSession resource entity (see clause 7.2.3.2.1) is included in the request message body, but only properties externalApplicationId and supportedDomains are present (because the other properties are unknown to the Direct Data Collection Client).

2. In its 201 Created response, the Data Collection AF provides an extended version of the DataReportingSession resource entity in the message body, adding the properties sessionId, validUntil, reportForDomains and reportingCondition to the entity received from the Direct Data Collection Client in step 1. The validUntil property of the provided DataReportingSession should be a time in the future.

The Direct Data Collection Client is now configured.

#### 4.3.2.3 Updating and renewing data collection and reporting configuration

##### 4.3.2.3.1 Introduction

The data collection and reporting configuration may change as a result of subscriptions to events exposed by the Data Collection AF. There are two ways the data collection and reporting configuration can be updated or renewed by the Direct Data Collection Client:

The data collection and reporting configuration may change as a result of subscriptions to events exposed by the Data Collection AF. There are two ways the data collection and reporting configuration can be updated or renewed by the Direct Data Collection Client:

1. The Direct Data Collection Client invokes the Ndcaf\_DataReporting\_RetrieveSession service operation (see clause 4.3.2.3.2).

2. The Data Collection AF supplies a DataReportingSession in response to a data report submitted by the Direct Data Collection Client (see clause 4.3.2.3.3).

##### 4.3.2.3.2 Direct Data Collection Client retrieves up-to-date configuration

This operation is typically performed when the validUntil property of the current DataReportingSession stored in the Direct Data Collection Client is about to expire.



Figure 4.3.2.3.2-1: Direct Data Collection Client retrieves up-to-date DataReportingSession

The steps in this procedure are as follows:

1. The Direct Data Collection Client requests the DataReportingSession for the current session by using the Ndcaf\_DataReporting \_RetreiveSession service operation (see clauses 7.2.2.1 and 7.2.2.3.3.1).

2. The Data Collection AF provides the latest DataReportingSession in the message body of a 200 OK response. The validUntil property of the provided DataReportingSession should be a time in the future. In addition, the Data Collection AF may change properties reportForDomains and reportingCondition.

##### 4.3.2.3.3 DataReportingSession updated in response to data reporting

See clause 4.3.3.

#### 4.3.2.4 Direct Data Collection Client destroys Data Reporting Session

The Direct Data Collection Client may destroy a Data Reporting Session and the data collection and reporting configuration it represents by invoking the Ndcaf\_DataReporting\_DestroySession service operation.



Figure 4.3.2.3-1: Direct Data Collection Client destroys DataReportingSession

The steps in this procedure are as follows:

1. The Direct Data Collection Client invokes the Ndcaf\_DataReporting\_DestroySession service operation by sending an HTTP DELETE request to the Data Collection AF (see clauses 7.2.2.1 and 7.2.2.3.3.2).

2. The Data Collection AF acknowledges the destruction of the session and its configuration with a 204 No Content response.

### 4.3.3 Direct data reporting

After acquiring its data collection and configuration from the Data Collection AF, and in accordance with this configuration, the Direct Data Collection Client shall send domain-specific data reports to the Data Collection AF by invoking the *Data Reporting API* associated with Ndcaf\_DataReporting service across reference point R2 as described under clause 7.3. The data reports shall be supplied in a generic data report envelope that includes at minimum the baseline information for data reporting defined in clause 4.6.4 of TS 26.531 [7].

The call flow in figure 4.3.3‑1 shows the procedure for direct data reporting.

NOTE: It is assumed that the Direct Data Collection Client is already configured per the procedures specified in clause 4.3.2.



Figure 4.3.3-1: Direct data reporting

1. When the reportCondition of a DataReportingSession is fulfilled, the Direct Data Collection Client invokes the Ndcaf\_DataReporting\_Report service operation (see clauses 7.3.2.1 and 7.3.2.2.3.1) by issuing an HTTP POST request to the Data Collection AF. The request message body is a DataReport (see clause 7.3.3.2.1).

2. In the HTTP response the Data Collection AF may provide an up-to-date DataReportingSession. The Direct Data Collection Client shall take note of any changes and act accordingly.

## 4.4 UE-internal procedures

### 4.4.1 General

This clause specifies the procedures used by internal UE entities, namely a UE Application and the associated Direct Data Collection Client, in support of UE data collection by the Direct Data Collection Client for subsequent reporting to the Data Collection AF.

# 5 General Aspects of APIs for Data Collection and Reporting

## 5.1 Overview

## 5.2 HTTP resource URIs and paths

The resource URI used in each HTTP request to the API provider shall have the structure defined in subclause 4.4.1 of TS 29.501 [17], i.e.:

{apiRoot}/{apiName}/{apiVersion}/{apiSpecificResourceUriPart}

with the following components:

- {apiRoot} shall be set as described in TS 29.501 [17].

- {apiName}shall be set as defined by the following clauses.

- {apiVersion} shall be set to "v1".

- {apiSpecificResourceUriPart} shall be set as described in the following clauses.

## 5.3 Usage of HTTP

### 5.3.1 HTTP protocol version

For interfaces internal to 5GC, HTTP/2, IETF RFC 7540 [18], shall be used as specified in clause 5.2 of TS 29.500 [9].

For other interfaces, support of HTTP/1.1 (IETF RFC 7230 [19], IETF RFC 7231 [20], IETF RFC 7232 [21], IETF RFC 7233 [22], IETF RFC 7234 [23] and IETF RFC 7235 [24]) over TLS is mandatory and support of HTTP/2 (IETF RFC 7540 [18]) over TLS is recommended.

Editor’s Note: Which interfaces are internal to 5GC depends on deployment configuration. Notably, R2 is always considered external to 5GC.

### 5.3.2 HTTP standard headers

#### 5.3.2.1 General

See clause 5.2.2 of TS 29.500 [9] for the usage of HTTP standard headers.

#### 5.3.2.2 Origin

The Origin header shall be supported at reference point R2.

#### 5.3.2.3 Content type

The format of HTTP message bodies specified in the present document shall be JSON as specified in clause 5.4 of 3GPP TS 29.500 [9]. The use of the JSON format shall be signalled by the content type "application/json", as specified in section 11 of IETF RFC 8259 [12].

### 5.3.3 HTTP response codes

Guidelines for error responses to the invocation of APIs of NF services are specified in clause 4.8 of TS 29.501 [17]. API-specific error responses are specified in the respective technical specifications.

## 5.4 Common API data types

### 5.4.1 Simple data types

### 5.4.2 Structured data types

### 5.4.3 Enumerated data types

#### 5.4.3.1 DataCollectionClientType enumeration

Enumeration of the DataCollectionClientType is defined in table 5.4.3.1-1.

Table 5.4.3.1-1 Enumeration of DataCollectionClientType

|  |  |
| --- | --- |
| Enumeration value | Description |
| DIRECT | Direct Data Collection Client. |
| INDIRECT | Indirect Data Collection Client. |
| APPLICATION\_SERVER | Application Server performing the role of a data collection client. |

## 5.5 Explanation of API data model notation

# 6 Ndcaf\_DataReportingProvisioning service

## 6.1 General

This clause specifies the API used to provision data collection and reporting in the Data Collection AF.

## 6.2 Provisioning Sessions API

### 6.2.1 Overview

This clause specifies the provisioning API used by the Provisioning AF of an Application Service Provider to provision and manipulate data collection and event exposure configurations in a Data Collection AF, via the *Ndcaf\_DataReportingProvisioning* service.

### 6.2.2 Resources

#### 6.2.2.1 Resource structure

Figure 6.2.2.1-1 depicts the URL path model for the Data Reporting Provisioning Sessions resource collection and its subordinate Data Reporting Provisioning Session resources of the *Ndcaf\_DataReportingProvisioning* service.



Figure 6.2.2.1‑1: URL path model of Data Reporting Provisioning Session related resources

Table 6.2.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.2‑1: Resources and methods overview

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Service name | Operation name | Resource name | Resource path suffix | HTTP method | Description |
| Ndcaf\_DataReportingProvisioning | CreateSession | Data Reporting Provisioning Sessions | /sessions | POST | Provisioning AF establishes a Data Reporting Provisioning Session with the Data Collection AF by providing information on what data is to be collected by the Data Collection AF, and how that data is to be processed by the Data Collection AF for subsequent exposure to Event notification subscribers. |
| UpdateSession | Data Reporting Provisioning Session | /sessions/{sessionId | PUT,PATCH | Modifies an existing Data Reporting Provisioning Session resource at the Data Collection AF. |
| RetrieveSession | Data Reporting Provisioning Session | /sessions/{sessionId} | GET | Retrieves an existing Data Reporting Provisioning Session resource from the Data Collection AF. |
| DestroySession |  |  | DELETE | Destroys a Data Reporting Provisioning Session resource. |

#### 6.2.2.2 Data Reporting Provisioning Sessions resource collection

##### 6.2.2.2.1 Description

The Data Reporting Provisioning Sessions resource collection represents the set of all Data Reporting Provisioning Sessions at a given Data Collection AF (service) instance. The resource collection enables a Provisioning AF to create new Data Reporting Provisioning Session resources, and to manipulate configuration data of an existing Data Reporting Provisioning Session resource, at the Data Collection AF.

##### 6.2.2.2.2 Resource definition

Resource URL: **{apiRoot}/3gpp-ndcaf\_data-reporting-provisioning/{apiVersion}/sessions**

This resource shall support the resource URL variables defined in table 6.2.2.2.2-1.

Table 6.2.2.2.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 5.2. |
| apiVersion |  | See clause 5.2. |

##### 6.2.2.2.3 Resource Standard Methods

###### 6.2.2.2.3.1 Ndcaf\_DataReportingProvisioning\_CreateSession operation using POST method

This service operation shall support the URL query parameters specified in table 6.2.2.2.3.1-1.

Table 6.2.2.2.3.1-1: URL query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This service operation shall support the request data structures specified in table 6.2.2.2.3.1-2 and the response data structures and response codes specified in table 6.2.2.2.3.1-4.

Table 6.2.2.2.3.1-2: Data structures supported by the POST request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DataReportingProvisioningSession | M | 1 | Data supplied by the Provisioning AF to enable creation of a new Data Reporting Provisioning Session at the Data Collection AF. |

Table 6.2.2.2.3.1-3: Headers supported for POST requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request  header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the Provisioning AF (see NOTE). |
| Origin | string | O | 0..1 | Indicates the origin of the requester. |
| NOTE: If OAuth 2.0 authorization is used the value is Bearer followed by a string representing the access token, see section 2.1 of RFC 6750 [8]. |

Table 6.2.2.2.3.1-4: Data structures supported by the POST response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| DataReportingProvisioningSession | M | 1 | 201 Created | The creation of a Data Reporting Provisioning Session resource along with the configuration data provided by the Provisioning AF for this session is confirmed by the Data Collection AF. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of TS 29.500 [9] also apply. |

Table 6.2.2.2.3.1-5: Headers supported by the *201* (*Created*) response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | The URL of the newly created resource at the Data Collection AF, according to the structure: {apiRoot}/ndcaf-data-reporting-provisioning/{apiVersion}/sessions/{sessionId} |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location |

NOTE: Standard HTTP redirection using a 3xx response code with the Location header as well as Alt-Svc are allowed.

#### 6.2.2.3 Data Reporting Provisioning Session resource

##### 6.2.2.3.1 Description

The Data Reporting Provisioning Session resource represents a single session within the collection of Data Reporting Provisioning Sessions at a given Data Collection AF service instance.

##### 6.2.2.3.2 Resource definition

Resource URL: **{apiRoot}/3gpp-ndcaf\_data-reporting-provisioning/{apiVersion}/sessions/{sessionionId}**

This resource shall support the resource URI variables defined in table 6.2.2.3.2-1.

Table 6.2.2.3.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 5.2. |
| sessionId | string | See clause 5.2. |

##### 6.2.2.3.3 Resource standard methods

###### 6.2.2.3.3.1 Ndcaf\_DataReportingProvisioning\_RetrieveSession operation using GET method

This method shall support the URL query parameters specified in table 6.2.2.3.3.1-1 and the headers specified in table 6.2.2.3.3.1-2.

Table 6.2.2.3.3.1-1: URL query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

Table 6.2.2.3.3.1-2: Headers supported for GET requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the Provisioning AF (see NOTE). |
| Origin | string | O | 0..1 | Indicates the origin of the requester. |
| NOTE: If OAuth 2.0 authorization is used, the value is Bearer followed by a string representing the access token, see section 2.1 RFC 6750 [8]. |

This method shall support the response data structures and response codes specified in table 6.2.2.3.3.1-3.

Table 6.2.2.3.3.1-3: Data structures supported by the GET response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| DataReportingProvisioningSession | M | 1 | 200 OK | The requested Data Reporting Provisioning Session resource is returned to the Provisioning AF by the Data Collection AF. |
| ProblemDetails | O | 0..1 | 307 Temporary Redirect | Temporary redirection during a Data Reporting Session Provisioning session retrieval procedure. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" (Extended Support of HTTP 307/308 redirection as defined in TS 29.502 [11]) is supported. |
| ProblemDetails | O | 0..1 | 308 Permanent Redirect | Permanent redirection during a Data Reporting Session Provisioning session retrieval procedure. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" is supported. |
| ProblemDetails | O | 0..1 | 404 Not Found | This Data Reporting Provisioning Session resource does not exist (see NOTE 2). |
| NOTE 1: The mandatory HTTP error status codes for the GET method as listed in table 5.2.7.1-1 of TS 29.500 [9] also apply.NOTE 2: Failure cases are described in subclause 6.2.4. |

Table 6.2.2.3.3.1-4: Headers supported by the 200 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

Table 6.2.2.3.3.1-5: Headers supported by the 307 and 308 response codes on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URL of the resource located in another Data Collection AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. Valid values: POST, PUT, DELETE |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location |

###### 6.2.2.3.3.2 Ndcaf\_DataReportingProvisioning\_UpdateSession operation using PUT or PATCH method

This method shall support the URL query parameters specified in table 6.2.2.3.3.2-1.

Table 6.2.2.3.3.2-1: URL query parameters supported by the PUT or PATCH method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This method shall support the request data structures specified in table 6.2.2.3.3.2-2 and the response data structures and response codes specified in table 6.2.2.3.3.2-4.

Table 6.2.2.3.3.2-2: Data structures supported by the PUT or PATCH request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DataReportingProvisioningSession | M | 1 | Parameters to replace or modify an existing Data Reporting Provisioning Session resource. |

Table 6.2.2.3.3.2-3: Headers supported for PUT or PATCH requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the Provisioning AF (see NOTE). |
| Origin | string | O | 0..1 | Indicates the origin of the requester. |
| NOTE : If OAuth 2.0 authorization is used the value is *Bearer* followed by a string representing the access token, see section 2.1 RFC 6750 [8] |

Table 6.2.2.3.3.2-4: Data structures supported by the PUT or PATCH response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| DataReportingProvisioningSession | M | 1 | 200 OK | The replacement or modification of a Data Reporting Session Provisioning resource along with the configuration data provided by the Provisioning AF for this session is confirmed by the Data Collection AF. |
| ProblemDetails | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during a Data Reporting Provisioning Session replacement or modification procedure. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" (Extended Support of HTTP 307/308 redirection as defined in TS 29.502 [11]) is supported.  |
| ProblemDetails | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during a Data Reporting Provisioning Session replacement or modification procedure. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" is supported. |
| ProblemDetails | O | 0..1 | 404 Not Found | This Data Reporting Provisioning Session resource does not exist (see NOTE 2). |
| NOTE 1: The mandatory HTTP error status codes for the PUT and PATCH methods listed in table 5.2.7.1-1 of TS 29.500 [9] also apply.NOTE 2: Failure cases are described in subclause 6.2.4. |

Table 6.2.2.3.3.2-5: Headers supported by the 200 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

Table 6.2.2.3.3.2-6: Headers supported by the 307 and 308 response codes on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URL of the resource located in another Data Collection AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. Valid values: POST, PUT, *PATCH,* DELETE |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location |

###### 6.2.2.3.3.3 Ndcaf\_DataReportingProvisioning\_DestroySession operation using DELETE method

This service operation shall support the URL query parameters specified in table 6.2.2.3.3.3-1.

Table 6.2.2.3.3.3-1: URL query parameters supported by the DELETE method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This method shall support the request data structures and headers as specified in tables 6.2.2.3.3.3-2 and 6.2.2.3.3.3-3, respectively. Furthermore, this method shall support the response data structures as specified in table 6.2.2.3.3.3-4, and the different response codes as specified in tables 6.2.2.3.3.3-5 and 6.2.2.3.3.3-6, respectively.

Table 6.2.2.3.3.3-2: Data structures supported by the DELETE request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
|  |  |  |  |

Table 6.2.2.3.3.3-3: Headers supported for DELETE requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the Provisioning AF (see NOTE). |
| Origin | string | O | 0..1 | Indicates the origin of the requester.) |
| NOTE: If OAuth 2.0 authorization is used the value is *Bearer* followed by a string representing the access token, see section 2.1 of RFC 6750 [8]. |

Table 6.2.2.3.3.3-4: Data structures supported by the DELETE response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| n/a |  |  | 204 No Content | Success case: The Data Reporting Provisioning Session resource matching the sessionId was destroyed at the Data Collection AF. |
| ProblemDetails | O | 0..1 | 307 Temporary Redirect | Temporary redirection during Data Reporting Provisioning Session destruction. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" as defined in TS 29.502 [11] is supported. |
| ProblemDetails | O | 0..1 | 308 Permanent Redirect | Permanent redirection during Data Reporting Provisioning Session destruction. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" is supported. |
| ProblemDetails | O | 0..1 | 404 Not Found | The Data Reporting Provisioning Session resource does not exist (see NOTE 2). |
| NOTE 1: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.7.1-1 of TS 29.500 [9] also apply.NOTE 2: Failure cases are described in subclause 6.2.4. |

Table 6.2.2.3.3.3-5: Headers supported by the 204 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

Table 6.2.2.3.3.3-6 Headers supported by the 307 and 308 response codes on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URL of the resource located in another Data Collection AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10].Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, *PATCH,* DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

### 6.2.3 Data model

#### 6.2.3.1 General

Table 6.2.3.1-1 specifies the data types used by the Ndcaf\_DataReportingProvisioning\_‌CreateSession, Ndcaf\_DataReportingProvisioning\_‌Retrieve‌Session, Ndcaf\_DataReportingProvisioning\_‌UpdateSession and Ndcaf\_DataReportingProvisioning\_‌DestroySession operations.

Table 6.2.3.1-1: Data types specific to Ndcaf\_DataReportingProvisioning\_CreateSession, Ndcaf\_DataReportingProvisioning\_RetrieveSession, Ndcaf\_DataReportingProvisioning\_UpdateSession and Ndcaf\_DataReportingProvisioning\_DestroySession operations

|  |  |  |
| --- | --- | --- |
| Data type | Clause defined | Description |
| DataReportingProvisioningSession | 6.2.3.2.1 | Configuration by the Data Collection AF of the Provisioning AF, specifying the data to be collected, processed and reported via Event exposure. |

Table 6.2.3.1-2 specifies data types re-used from other specifications by the Ndcaf\_DataReportingProvisioning\_‌CreateSessions, Ndcaf\_DataReportingProvisioning\_‌RetrieveSession, Ndcaf\_DataReportingProvisioning\_‌UpdateSession and Ndcaf\_DataReportingProvisioning\_‌Destroy‌Session operations, including a reference to their respective specifications.

Table 6.2.3.1-2: Externally defined data types used by Ndcaf\_DataReportingProvisioning\_CreateSession, Ndcaf\_DataReportingProvisioning\_RetrieveSession, Ndcaf\_DataReportingProvisioning\_UpdateSession and Ndcaf\_DataReportingProvisioning\_DestroySession operations

|  |  |  |
| --- | --- | --- |
| Data type | Comments | Reference |
| AfEvent | Identifies a type of event. | TS 29.517 [5] |
| ApplicationId | Identifies the reporting application. | TS 29.571 [12] |
| DateTime | A point in time, expressed as an ISO 8601 [25] date and time. |
| DurationSec | A period of time, expressed in seconds. |
| Double |  |
| Float |  |
| Int32 |  |
| Int64 |  |
| Uint16 |  |
| Uint32 |  |
| Uint64 |  |
| Uinteger |  |

#### 6.2.3.2 Structured data types

##### 6.2.3.2.1 DataReportingProvisioningSession resource type

Table 6.2.3.2.1-1: Definition of DataReportingProvisioningSession resource type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property name | Data type | Cardinality | Usage | Description |
| provisioningSessionId | string | 1..1 | C: RR: ROU: RO | A unique identifier for this Data Reporting Provisioning Session. |
| aspId | AspId | 1..1 | C: WR: ROU: RO | The identity of the Application Service Provider (as specified in clause 5.6.2.3 of TS 29.514 [26]) whose Provisioning AF is responsible for this Data Reporting Provisioning Session. |
| externalApplicationId | ApplicationID | 1..1 | C: RWR: ROU: RO | The external application identifier (see TS 29.571 [12]), nominated by the Provisioning AF, to which this Data Reporting Provisioning Session pertains, and which is present in data reports submitted to the Data Collection AF.This property may also be used by the Event Consumer AF (located outside trusted domain) to subscribe to events in the Data Collection AF (located inside trusted domain). |
| internalApplicationId | ApplicationID | 0..1 | C: RWR: ROU: RO | The internal application identifier (see TS 29.571 [12]) to be used by event consumers inside the trusted domain (including the NWDAF, the Event Consumer AF and the NEF) when subscribing to events in the Data Collection AF.This shall be provided by a Provisioning AF deployed inside the trusted domain when it creates a Data Reporting Provisioning Session. When the Provisioning AF is deployed outside the trusted domain, the NEF shall supply this property on behalf of the Provisioning AF by translating the externalApplicationId value supplied above into the corresponding internal application identifier here.Always present when this Data Reporting Provisioning Session is returned to an entity inside the trusted domain. Never present when the Data Reporting Provisioning Session is returned to an entity outside the trusted domain. |
| eventId | AfEvent | 1..1 | C: ROR: ROU: RO | The type of event to which this Data Reporting Provisioning Session pertains. (See clause 5.6.3.3 of TS 29.517 [5].) |
| dataReportingConfigurationIds | Array(ResourceId) | 0..1 | C: —R: ROU: RO | A set of identifiers for Data Reporting Configurations currently associated with this Data Reporting Provisioning Session. |

### 6.2.4 Error handling

### 6.2.5 Mediation by NEF

## 6.3 Data Reporting Configuration API

### 6.3.1 Overview

This clause specifies the reporting API used by the Data Collection AF to report UE data that has been collected to the Data Collection AF.

### 6.3.2 Resource structure

### 6.3.3 Data model

#### 6.3.3.1 DataReportingConfiguration resource type

The structure of the DataReportingConfiguration resource is defined in table 6.3.3.1-1.

Table 6.3.3.1-1: Definition of DataReportingConfiguration resource type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property name | Data type | Cardinality | Usage | Description |
| dataReportingConfigurationId | ResourceId | 1..1 | C: RU: – | A unique identifier for this Data Reporting Configuration. |
| dataCollectionClientType | DataCollection‌Client‌Type | 1..1 | C: RWU: RW | The type of data collection client to which this Data Reporting Configuration pertains. |
| authorizationURL | Url | 0..1 | C: RWU: RW | A URL that may be used to authorize the consumer entity prior to a data reporting subscription. |
| dataAccessProfiles | Array(Data‌Access‌Profile) | 1..1 | C: RWU: RW | One or more Data Access Profile definitions, each describing a set of data processing instructions, applied by the Data Collection AF when exposing events. |

#### 6.3.3.2 DataAccessProfile type

The DataAccessProfile type is defined in table 6.3.3.2-1.

Table 6.3.3.2-1 Definition of DataAccessProfile type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property name | Data type | Cardinality | Usage | Description |
| *targetEventConsumer‌Types* | Array(Event‌Consumer‌Type) | 1..1 | C:RWU:RW | The set of Event consumer types (see clause 6.3.3.3) to which this Data Access Profile is targeted.If the set is empty, this Data Access Profile applies to all types of Event consumer. |
| parameters | Array(String) | 1..1 | C:RWU:RW | The set of collected UE data parameters for which these restrictions apply.Each Event ID shall define a controlled vocabulary to uniquely identify its UE data parameters.If the set is empty, the restrictions apply to all parameters for the Event ID of the parent Data Reporting Configuration. |
| timeAccessRestrictions | Object | 0..1 | C:RWU:RW | Configuration for access restrictions along the time dimension. |
|  duration | DurationSec | 1..1 | C:RWU:RW | The period of time over which access is to be aggregated. |
|  aggregationFunctions | Array(Data‌Aggregation‌Function‌Type) | 1..1 | C:RWU:RW | An ordered, non-empty list of aggregation functions (see clause 6.3.3.4) applied to the event data prior to exposure to event consumers. |
| userAccessRestrictions | Object | 0..1 | C:RWU:RW | Configuration for access restrictions along the user dimension. |
|  groupIds | Array(GroupId) | 1..1 | C:RWU:RW | Identifiers of the UE groups over which access is to be aggregated. |
|  userIds | Array(Gpsi) or Array(Supi) | 1..1 | C:RWU:RW | Identifiers of the UEs comprising a group over which access is to be aggregated. |
|  aggregationFunctions | Array(Data‌Aggregation‌Function‌Type) | 1..1 | C:RWU:RW | An ordered, non-empty list of aggregation functions (see clause 6.3.3.4) applied to the event data prior to exposure to event consumers. |
| locationAccessRestrictions | Object | 0..1 | C:RWU:RW | Configuration for access restrictions along the location dimension |
|  locationAreas | Array(Location‌Area‌5G) | 1..1 | C:RWU:RW | Identifiers of geographical areas over which access is to be aggregated. Event data is grouped by the location of the UE during the data collection. |
|  aggregationFunctions | Array(Data‌Aggregation‌Function‌Type) | 1..1 | C:RWU:RW | An ordered, non-empty list of aggregation functions (see clause 6.3.3.4) applied to the event data prior to exposure to event consumers. |
| NOTE: Data types DurationSec, GroupId, Gpsi, Supi and LocationArea5G are defined in TS29.571[13]. |

#### 6.3.3.3 EventConsumerType enumeration

Table 7.11.3.3‑1: Definition of EventConsumerType enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| NWDAF | The Network Data Analytics Function is the Event Consumer. |
| EVENT\_CONSUMER\_AF | The Event Consumer AF is the Event Consumer. |
| NEF | The Network Exposure Function is the Event Consumer. |

#### 6.3.3.4 DataAggregationFunctionType enumeration

Enumeration of the DataAggregationFunctionType is defined in table 6.3.3.4-1.

Table 6.3.3.4-1 Enumeration of DataAggregationFunctionType

|  |  |
| --- | --- |
| Enumeration value | Description |
| NULL | No aggregation is applied: all values of the UE data parameter(s) are exposed to event consumers. |
| COUNT | The number of observed events over the indicated time period or the indicated set of users or the indicated set of locations is exposed to event consumers. |
| MEAN | The mean average of the values of the UE data parameter(s) over the indicated time period or the indicated set of users or the indicated set of locations is exposed to event consumers. |
| MAXIMUM | The maximum observed value of the UE data parameter(s) over the indicated time period or the indicated set of users or the indicated set of locations is exposed to event consumers. |
| MINIMUM | The minimum observed value of the UE data parameter(s) over the indicated time period or the indicated set of users or the indicated set of locations is exposed to event consumers. |
| SUM | The sum of the values of the UE data parameter(s) over the indicated time period or the indicated set of users or the indicated set of locations is exposed to event consumers. |

### 6.3.4 Mediation by NEF

# 7 Ndcaf\_DataReporting service

## 7.1 General

This clause specifies the APIs used by clients of the Data Collection AF to obtain a data collection and reporting configuration from, and then report data to, the Data Collection AF.

## 7.2 Data Collection and Reporting Configuration API

### 7.2.1 Overview

This clause specifies the configuration API used by data collection clients to obtain their data collection and reporting configurations from the Data Collection AF.

### 7.2.2 Resources

Figure 7.2.2.1-1 depicts the URL path model for the Data Reporting Sessions resource collection and the Data Reporting Session resources of the *Ndcaf\_DataReporting* service.



Figure 7.2.2.1‑1: URL path model of Data Reporting Session related resources

Table 7.2.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.2.2.1-1: Resources and methods overview

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Service name | Operation name | Resource name | Resource path suffix | HTTP method | Description |
| Ndcaf\_DataReporting | CreateSession | Data Reporting Sessions | /sessions | POST | Data collection client establishes a UE data reporting session with the Data Collection AF, providing information about what UE data it can report, and is provided with a configuration in response. |
| RetrieveSession | Data Reporting Session | /sessions/{sessionId} | GET | Retrieves a Data Reporting Session resource from the Data Collection AF. |
|  |  |  |  |  |  |
|  | DestroySession |  |  | DELETE | Destroys a Data Reporting Session resource. |

#### 7.2.2.2 Data Reporting Sessions resource collection

##### 7.2.2.2.1 Description

The Data Reporting Sessions resource collection represents the set of all Data Collection Sessions at a given Data Collection AF (service) instance. The resource collection allows a data collection client to create a new Data Reporting Session resource at, and to receive configuration details for that session from, the Data Collection AF.

##### 7.2.2.2.2 Resource definition

Resource URL: **{apiRoot}/3gpp-ndcaf\_data-reporting/{apiVersion}/sessions**

This resource shall support the resource URL variables defined in table 7.2.2.2.2-1.

Table 7.2.2.2.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | Fully-Qualified Doman Name of the Data Collection AF and path prefix. |

##### 7.2.2.2.3 Resource Standard Methods

###### 7.2.2.2.3.1 Ndcaf\_DataReporting\_CreateSession operation using POST method

This service operation shall support the URL query parameters specified in table 7.2.2.2.3.1-1.

Table 7.2.2.2.3.1-1: URL query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This service operation shall support the request data structures specified in table 7.2.2.2.3.1-2 and the response data structures and response codes specified in table 7.2.2.2.3.1-4.

Table 7.2.2.2.3.1-2: Data structures supported by the POST request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DataReportingSession | M | 1 | Data supplied by the data collection client to enable creation of a new Data Reporting Session at the Data Collection AF. |

Table 7.2.2.2.3.1-3: Headers supported for POST requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request  header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the data collection client. (NOTE 1) |
| Origin | string | O | 0..1 | Indicates the origin of the requester. (NOTE 2) |
| NOTE 1: If OAuth 2.0 authorization is used the value is *Bearer* followed by a string representing the access token, see section 2.1 of RFC 6750 [8].NOTE 2: The Origin header is always supplied if the data collection client is deployed in a web browser. |

Table 7.2.2.2.3.1-4: Data structures supported by the POST response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| DataReportingSession | M | 1 | 201 Created | The creation of a Data Reporting Session is confirmed and configuration data for the data collection client for the session is provided by the Data Collection AF. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [9] also apply. |

Table 7.2.2.2.3.1-5: Headers supported by the *201* (*Created*) response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | The URL of the newly created resource at the Data Collection AF, according to the structure: {apiRoot}/ndcaf-datareporting/{apiVersion}/sessions/{sessionId} |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location |

NOTE: Standard HTTP redirection using a 3xx response code with the Location header as well as Alt-Svc are allowed.

#### 7.2.2.3 Data Reporting Session resource

##### 7.2.2.3.1 Description

The Data Reporting Session resource represents a single session within the collection of Data Reporting Sessions at a given Data Collection AF.

##### 7.2.2.3.2 Resource definition

Resource URL: **{apiRoot}/3gpp-ndcaf\_data-reporting/{apiVersion}/sessions/{sessionionId}**

This resource shall support the resource URI variables defined in table 7.2.2.3.2-1.

Table 7.2.2.3.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 7.2.2.2.2 |
| sessionId | string | Identifies a session to the Ndcaf\_DataReporting\_Sessions Service |

##### 7.2.2.3.3 Resource standard methods

###### 7.2.2.3.3.1 Ndcaf\_DataReporting\_RetrieveSession operation using GET method

This service operation shall support the URL query parameters specified in table 7.2.2.3.3.1-1 and the headers specified in table 7.2.2.3.3.1-2.

Table 7.2.2.3.3.1-1: URL query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

Table 7.2.2.3.3.1-2: Headers supported for GET requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the data collection client. NOTE1 |
| Origin | string | O | 0..1 | Indicates the origin of the requester. NOTE2 |
| NOTE 1: If OAuth 2.0 authorization is used, the value is Bearer followed by a string representing the access token, see section 2.1 RFC 6750 [8].NOTE 2: The Origin header is always supplied if the data collection client is deployed in a Web Browser. |

This service operation shall support the response data structures and response codes specified in table 7.2.2.3.3.1-3.

Table 7.2.2.3.3.1-3: Data structures supported by the GET response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| DataReportingSession | M | 1 | 200 OK | The Data Reporting Session resource was modified successfully by configuration data provided by the data collection client. |
| ProblemDetails | O | 0..1 | 307 Temporary Redirect | Temporary redirection during a Data Reporting Session modification. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" (Extended Support of HTTP 307/308 redirection as defined in TS 29.502 [11]) is supported. |
| ProblemDetails | O | 0..1 | 308 Permanent Redirect | Permanent redirection during a Data Reporting Session modification. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" is supported. |
| ProblemDetails | O | 0..1 | 404 Not Found | This Data Reporting Session resource does not exist. (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the GET method as listed in table 5.2.7.1-1 of 3GPP TS 29.500 [9] also apply.NOTE 2: Failure cases are described in subclause 7.2.4. |

Table 7.2.2.3.3.1-4: Headers supported by the 200 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

Table 7.2.2.3.3.1-5: Headers supported by the 307 and 308 response codes on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URL of the resource located in another Data Collection AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. Valid values: POST, PUT, DELETE |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location |

###### 7.2.2.3.3.2 Ndcaf\_DataReporting\_UpdateSession operation using PUT method

The update operation is not permitted.

|  |  |  |  |  |
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###### 7.2.2.3.3.3 Ndcaf\_DataReporting\_DestroySession operation using DELETE method

This service operation shall support the URL query parameters specified in table 7.2.2.3.3.3-1.

Table 7.2.2.3.3.3-1: URL query parameters supported by the DELETE method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This service operation shall support the request data structures and headers as specified in tables 7.2.2.3.3.3-2 and 7.2.2.3.3.3-3, respectively. Furthermore, this service operation shall support the response data structures as specified in table 7.2.2.3.3.3-4, and the different response codes as specified in tables 7.2.2.3.3.3-5 and 7.2.2.3.3.3-6, respectively.

Table 7.2.2.3.3.3-2: Data structures supported by the DELETE request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
|  |  |  |  |

Table 7.2.2.3.3.3-3: Headers supported for DELETE requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the data collection client. (NOTE 1) |
| Origin | string | O | 0..1 | Indicates the origin of the requester. (NOTE 2) |
| NOTE 1: If OAuth 2.0 authorization is used the value is *Bearer* followed by a string representing the access token, see section 2.1 of RFC 6750 [8].NOTE 2: The Origin header is always supplied if the data collection client is deployed in a web browser. |

Table 7.2.2.3.3.3-4: Data structures supported by the DELETE response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| n/a |  |  | 204 No Content | Successful case: The Data Reporting Session resource matching the sessionId was destroyed at the Data Collection AF. |
| ProblemDetails | O | 0..1 | 307 Temporary Redirect | Temporary redirection during Data Reporting Session destruction. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" as defined in TS 29.502 [11] is supported. |
| ProblemDetails | O | 0..1 | 308 Permanent Redirect | Permanent redirection during Data Reporting Session destruction. The response shall include a Location header field containing an alternative URL of the resource located in another Data Collection AF (service) instance.Applicable if the feature "ES3XX" is supported. |
| ProblemDetails | O | 0..1 | 404 Not Found | The Data Reporting Session resource does not exist. (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [9] also apply.NOTE 2: Failure cases are described in subclause 7.2.4. |

Table 7.2.2.3.3.3-5: Headers supported by the 204 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

Table 7.2.2.3.3.3-6 Headers supported by the 307 and 308 response codes on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URL of the resource located in another Data Collection AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10].Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: POST, PUT, DELETE. |
| Access-Control-Expose-Headers | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header.Valid values: Location. |

### 7.2.3 Data Model

#### 7.2.3.1 General

Table 7.2.3.1-1 specifies the data types used by the Ndcaf\_DataReporting\_CreateSession, Ndcaf\_DataReporting\_‌Retrieve‌Session and Ndcaf\_DataReporting\_DestroySession operations.

Table 7.2.3.1-1: Data types specific to Ndcaf\_DataReporting\_CreateSession, Ndcaf\_DataReporting\_RetrieveSession and Ndcaf\_DataReporting\_DestroySession operations

|  |  |  |
| --- | --- | --- |
| Data type | Clause defined | Description |
| DataReportingSession | 7.2.3.2.1 | Configuration by the Data Collection AF of the data collection client, specifying the data to be reported. |

Table 7.2.3.1-2 specifies data types re-used from other specifications by the Ndcaf\_DataReporting\_CreateSessions, Ndcaf\_DataReporting\_RetrieveSession and Ndcaf\_DataReporting\_‌Destroy‌Session operations, including a reference to their respective specifications.

Table 7.2.3.1-2: Externally defined data types used by Ndcaf\_DataReporting\_CreateSession, Ndcaf\_DataReporting\_RetrieveSession and Ndcaf\_DataReporting\_DestroySession operations

|  |  |  |
| --- | --- | --- |
| Data type | Comments | Reference |
| ApplicationId | Identifies the reporting application. | 3GPP TS 29.571 [12] |
|  |  |  |
| DurationSec |  |  |
| Double |  |
| Float |  |
| Int32 |  |
| Int64 |  |
| Uint16 |  |
| Uint32 |  |
| Uint64 |  |
| Uinteger |  |

#### 7.2.3.2 Structured data types

##### 7.2.3.2.1 DataReportingSession resource type

Table 7.2.3.2.1-1: Definition of DataReportingSession resource type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property name | Data type | Cardinality | Usage | Description |
| sessionId | string | 0..1 | C: —R: RO | Unique identifier for this Data Reporting Session assigned by the Data Collection AF. |
| validUntil | DateTime | 0..1 | C: ROR: RO | The time when the information in this Data Reporting Session expires.The data collection client, if still active, should request an up-to-date Data Reporting Session before this time. |
| externalApplicationId | ApplicationID | 1 | C: RWR: RO | The external application identifier, nominated by the data collection client, to which this Data Reporting Session pertains. |
| supportedDomains | array(DataDomain) | 1 | C: RWU: RW | Set of domains for which the data collection client declares that it is able to report UE data. (See clause 7.2.3.3.1).An empty array indicates that no UE data can currently be reported. |
|  |  |  |  |  |
| reportingConditions | map(DataDomain ->array(ReportingCondition)) | 1..1 | C: —R: ROU: RO | A map, signalled by the Data Collection AF, specifying for each reporting domain listed the set of conditions (see clause 7.2.3.2.2) under which the data collection client reports UE data.The indices of the map shall be a subset of the reporting domains declared by the data collection client in supportedDomains.If the array for a particular index in the map is empty, UE data reporting shall be disabled for the indicated domain. |

##### 7.2.3.2.2 ReportingCondition type

Table 7.2.3.2.2-1: Definition of ReportCondition type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property name | Data type | P | Cardinality | Description |
| type | ReportingConditionType | M | 1 | Type of reporting condition (see clause 7.2.3.3.2). |
| period | DurationSec | C | 0..1 | The time period between UE data reports.Only present when type is INTERVAL. |
| parameter | string | C | 0..1 | Identifies the parameter that triggers a UE data report when it crosses the value threshold.Only present when type is THRESHOLD. |
| threshold | Double, Float, Int32, Int64, Uint16, Uint32, Uint64, or Uinteger | C | 0..1 | The value that parameter must cross to trigger a UE data report.Only present when type is THRESHOLD. |
|  |  |  |  |  |
| reportWhenBelow | boolean | C | 0..1 | The direction in which the threshold must be crossed to trigger a UE data report.If true, a report is triggered when the value of parameter drops below threshold.If false, a report is triggered when the value of parameter exceeds threshold.Only present when type is THRESHOLD. |
| eventTrigger | ReportingEventTrigger | C | 0..1 | The type of event that triggers a UE data report (see clause 7.2.3.3.3).Only present when type is EVENT. |
|  |

#### 7.2.3.3 Simple data types and enumerations

##### 7.2.3.3.1 DataDomain enumeration

Table 7.2.3.3.1-1: DataDomain enumeration

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability(refer to Table 7.3.3.2.1-1) |
| SERVICE\_EXPERIENCE | Service Experience data. | serviceExperienceRecords |
| LOCATION | Location data. | locationRecords |
| COMMUNICATION | Communication data. | communicationRecords |
| PERFORMANCE | Performance data. | performanceDataRecords |
| APPLICATION\_SPECIFIC | Combination of QoE metrics and application service-specific data. | applicationSpecificRecords |
| MS\_ACCESS\_ACTIVITY | 5GMS access activity data. | mediaStreamingAccessRecords |
| PLANNED\_TRIPS | Data related to planned trips. | tripPlanRecords |

##### 7.2.3.3.2 ReportingConditionType enumeration

Table 7.2.3.3.2-1: ReportingConditionType enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| INTERVAL | Report at a regular interval. |
| THRESHOLD | Report when a threshold is passed. |
| EVENT | Report on event. |
|  |  |

##### 7.2.3.3.3 ReportingEventTrigger enumeration

This clause lists the possible events (EVENT in table 7.2.3.3.2-1) that can be used to trigger a data report.

Table 7.2.3.3.3-1: Event enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| LOCATION | A new location has been entered (refer to clause A.3). |
| DESTINATION | A new destination has been recorded (refer to clause A.7). |

### 7.2.4 Error handling

Editor’s Note: TBA

### 7.2.5 Mediation by NEF

Editor’s Note: TBA

## 7.3 Data Reporting API

### 7.3.1 Overview

This clause specifies the reporting API used by a data collection client to report UE data that has been collected to the Data Collection AF.

### 7.3.2 Resources

#### 7.3.2.1 Resource structure

Figure 7.3.2.1-1 depicts the URL path model for the Data Report resource pertaining to an established Data Reporting Session of the *Ndcaf\_DataReporting* service.



Figure 7.3.2.1‑1: URL path model of Data Report resource

Table 7.3.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.3.2.1-1: Resources and methods overview

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Service name | Operation name | Resource name | Resource path suffix | HTTP method | Description |
| Ndcaf\_DataReporting | Report | Data Report | /sessions/{sessionId}/report | POST | Data collection client reports data to the Data Collection AF via the established session. |

#### 7.3.2.2 Data Report resource

##### 7.3.2.2.1 Description

The Data Report resource allows a data collection client to report data pertaining to an established Data Reporting Session to the Data Collection AF. The Data Collection AF can provide an updated configuration in the response.

##### 7.3.2.2.2 Resource definition

Resource URL: **{apiRoot}/3gpp-ndcaf\_data-reporting/{apiVersion}/sessions/{sessionId}/report**

This resource shall support the resource URL variables defined in table 7.3.2.2.2-1.

Table 7.3.2.2.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | Fully-Qualified Domain Name of the Data Collection AF and path prefix. |
| sessionId | string | Identifier of the Data Reporting Session unique within the scope of the Data Collection AF. |

##### 7.3.2.2.3 Resource Standard Methods

###### 7.3.2.2.3.1 Ndcaf\_DataReporting\_Report operation using POST method

This method shall support the URI query parameters specified in table 7.3.2.2.3.1-1.

Table 7.3.2.2.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This method shall support the request data structures specified in table 7.3.2.2.3.1-2 and the response data structures and response codes specified in table 7.3.2.2.3.1-4.

Table 7.3.2.2.3.1-2: Data structures supported by the POST request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DataReport | M | 1 | UE data reported by the data collection client. |

Table 7.3.2.2.3.1-3: Headers supported for POST requests on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request header | Data type | P | Cardinality | Description |
| Authorization | string | M | 1 | For authentication of the data collection client. (NOTE 1) |
| Origin | string | O | 0..1 | Indicates the origin of the requester. (NOTE 2) |
| NOTE 1: If OAuth 2.0 authorization is used the value is *Bearer* followed by a string representing the access token, see section 2.1 of RFC 6750 [8].NOTE 2: The Origin header is always supplied if the data collection client is deployed in a web browser. |

Table 7.3.2.2.3.1-4: Data structures supported by the POST response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| DataReportingSession | O | 0..1 | 200 OK | The report was accepted by the Data Collection AF.A data collection client configuration (updated or unchanged) may optionally be provided in the response. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [9] also apply. |

Table 7.3.2.2.3.1-5: Headers supported by the 200 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Access-Control-Allow-Origin | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. |
| Access-Control-Allow-Methods | string | O | 0..1 | Part of CORS [10]. Supplied if the request included the Origin header. Value: POST |

NOTE: Standard HTTP redirection (using a 3xx response with a Location response header) as well as Alt-Svc are allowed for this method.

### 7.3.3 Data Model

#### 7.3.3.1 General

Table 7.3.3.1-1 specifies the data types used by the Ndcaf\_DataReporting\_Report operation.

Table 7.3.3.1-1: Data types specific to Ndcaf\_DataReporting\_Report operation

|  |  |  |
| --- | --- | --- |
| Data type | Clause defined | Description |
| DataReport | 7.3.3.2.1 | Reported data by the data collection client to the Data Collection AF. |
| DataReportingSession | 7.2.3.2.1 | Configuration of the data collection client. |

Table 7.3.3.1-2 specifies data types re-used from other specifications by the Ndcaf\_DataReporting\_Report operation, including a reference to their respective specifications.

Table 7.3.3.1-2: Externally defined data types used by Ndcaf\_DataReporting\_Report operation

|  |  |  |
| --- | --- | --- |
| Data type | Comments | Reference |
| ApplicationId | Identifies the reporting application. | 3GPP TS 29.571 [12] |

#### 7.3.3.2 Structured data types

##### 7.3.3.2.1 DataReport type

Table 7.3.3.2.1-1: Definition of DataReport type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| externalApplicationId | ApplicationID | 1 | External application identifier. |
| serviceExperienceRecords | array(ServiceExperienceRecord) | 0..1 (NOTE) | See clause A.2. |
| locationRecords | array(LocationRecord) | See clause A.3. |
| communicationRecords | array(CommunicationRecord) | See clause A.4. |
| performanceDataRecords | array(PerformanceDataRecord) | See clause A.5. |
| applicationSpecificRecords | array(ApplicationSpecificRecord) | See clause A.6. |
| tripPlanRecords | array(TripPlanRecord) | See clause A.7. |
| mediaStreaming‌AccessRecords | array(MediaStreaming‌AccessRecord) | See TS 26.512 [13] clause 17.2. |
|  |  |  |  |
| NOTE: Exactly one of these properties must be present in a DataReport. |

#### 7.3.3.3 Simple data types and enumerations

There are no simple data types and enumerations specified in this release.

### 7.3.4 Mediation by NEF

# 8 Client API

## 8.1 General

This clause specifies the API used by internal UE entities, namely a UE Application and the associated Direct Data Collection Client, in support of UE data collection by the Direct Data Collection Client for subsequent reporting to the Data Collection AF.

# 9 Security and Access Control

This clause specifies the security functionality associated with UE data collection, reporting and exposure.

Editor’s Note: Text in this clause is expected to be based on the TS 26.531 stage 2 description of the Access Profile data model (also referred to as the combination of event processing instructions and event data restrictions).

Annex A (normative):
Data reporting data models

# A.1 Introduction

This annex describes the format of the data reports submitted to the Data Collection AF, as required by TS 23.288 [4].

Table A.1-1 specifies data types re-used from other specifications, including a reference to their respective specifications.

Table A.1-1: Externally defined data types used by Ndcaf\_DataReporting\_Report operation

|  |  |  |
| --- | --- | --- |
| Data type | Comments | Reference |
| BitRate |  | 3GPP TS 29.571 [12] |
| PacketDelBudget |  |
| PacketLossRate |  |
| DateTime |  |
| DurationSec |  |
| SvcExperience |  | 3GPP TS 29.517 [5] |
| AddrFqdn |  |
| TimeWindow |  | 3GPP TS 29.122 [14] |
| Volume |  |
| FlowInfo |  |
| LocationData5G |  | 3GPP TS 29.572 [15] |
| HorizontalSpeed |  |

# A.2 Service Experience reporting

## A.2.1 ServiceExperienceRecord type

Table A.2.1-1: Definition of ServiceExperienceRecord type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| timestamp | DateTime | 1 | Time stamp of this record. |
| serviceExperienceInfos | array(PerFlowServiceExperienceInfo) | 1 | See clause A.2.2. |

## A.2.2 PerFlowServiceExperienceInfo type

Table A.2.2-1: Definition of PerFlowServiceExperienceInfo type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| serviceExperience | SvcExperience | 1 |  |
| timeInterval | TimeWindow | 1 |  |
| remoteEndpoint | array(AddrFqdn) | 1 | FQDN or IP Address of remote endpoint (e.g., server). |

# A.3 Location reporting

## A.3.1 LocationRecord type

Table A.3.1-1: Definition of type LocationRecord

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Cardinality | Description |
| *timestamp* | *DateTime* | 1 | Time stamp of this record. |
| *location* | *LocationData5G* | 1 |  |

# A.4 Communication reporting

## A.4.1 CommunicationRecord type

Table A.4.1-1: Definition of type CommunicationRecord

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Cardinality | Description |
| *timestamp* | *DateTime* | 1 | Time stamp of this record. |
| *timeInterval* | *TimeWindow* | 1 |  |
| *uplinkVolume* | *Volume* | 0..1 | See NOTE. |
| *downlinkVolume* | *Volume* | 0..1 | See NOTE. |
| NOTE: at least one of *uplinkVolume* and *downlinkVolume* must be present |

# A.5 Performance Data reporting

## A.5.1 PerformanceDataRecord type

Table A.5.1-1: Definition of type PerformanceDataRecord

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Cardinality | Description |
| *timestamp* | *DateTime* | 1 | Time stamp of this record. |
| *timeInterval* | *TimeWindow* | 1 |  |
| *location* | *LocationArea5G* | 0..1 | Represents the UE location. |
| *remoteEndpoint* | *AddrFqdn* | 0..1 | FQDN or IP Address of remote endpoint (e.g., server) |
| *packetDelayBudget* | *PacketDelayBudget* | 0..1 | Indicates average Packet Delay. |
| *packetLossRate* | *PacketLossRate* | 0..1 | Indicates average Packet Loss Rate. |
| *uplinkThroughput* | *BitRate* | 0..1 | Indicates the average uplink throughput. |
| *downlinkThroughput* | *BitRate* | 0..1 | Indicates the average downlink throughput. |

# A.6 Application-specific reporting

## A.6.0 Introduction

Application-specific reporting is intended to allow reporting of any application-specific data.

## A.6.1 ApplicationSpecificRecord type

Different services will have different data that are of interest (depending on the service type). The ApplicationSpecificRecord type is intended to enable services to report data specific for the service or application.

Editor’s Note: To do that the recordIdentifierin form of a unique uri (see Table A.6.1-1) must be provided, and that uri must match a specification of the *container* used to hold the data.

Table A.6.1-1: Definition of ApplicationSpecificRecord type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| timestamp | DateTime | 1 | Time stamp of this record. |
| recordIdentifier | string | 1 | A controlled term in form of a URI that uniquely identifies the type of record that follows. |
| recordContainer | Object container or array container | 1 | Container with the actual application-specific data. |

# A.7 Trip Plan reporting

## A.7.0 Introduction

Trip Plan(s) enable the Data Collection AF to identify collective behavior amongst UEs. See tables 6.5.2‑4 and 6.5.2‑5 in 3GPP TS 23.288 [4].

## A.7.1 TripPlanRecord type

Table A.7.1-1: Definition of TripPlanRecord type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| timestamp | DateTime | 1 | Time stamp of this record. |
| startingPoint | LocationData5G | 1 | The starting point of the planned trip. |
| destination | LocationData5G | 1 | The destination of the planned trip. |
| route | array(LocationData5G) | 0..1 | The route of the planned trip. |
| averageSpeed | HorizontalSpeed | 0..1 | Estimated average speed of the planned trip. |
| arrivalTime | DateTime | 0..1 | Estimated time of arrival at the destination of the planned trip. |

Annex B (normative):
OpenAPI representation of REST APIs for data collection and reporting

# B.1 General

This annex is based on the OpenAPI 3.0.0 specification [16] and provides corresponding representations of all APIs defined in the present document.

NOTE 1: An OpenAPIs representation embeds JSON Schema representations of HTTP message bodies.

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

NOTE 2: 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.

# B.2 Data types applicable to multiple services

# B.3 Ndcaf\_DataReportingProvisioning service API

# B.4 Ndcaf\_DataReporting service API

Annex X (informative):
Change history

|  |
| --- |
| **Change history** |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2021-08 | Sa4#115-e | S4-211220 |  |  |  | Initial specification skeleton | 0.1.0 |
| 2021-11 | SA4#116-e | S4-211422S4-211578S4-211593 |  |  |  | Document reorganization, and miscellaneous modifications and corrections to previous document outline.Added text under clause previously empty clause 4.2.3.Added text to previously empty clauses 4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.3.2 and 4.3.3 | 0.2.0 |
| 2022-02 | SA4#117-e | S4-220233S4-220241S4-220242 |  |  |  | Additional references under clause 2, changes and added text under clause 4.2.3.3, changes and additions under clause 5.4, corrections and added text under clauses 7.2 and 7.3, new Annex A, and demoted existing Annexes A and B by one level, and added new subclause B.2. | 0.3.0 |
| 2022-03 | SA#95-e | SP-220248 |  |  |  | Presentation to SA for Information | 1.0.0 |
| 2022-04 | SA4#118-e | S4-220536S4-220537S4-220538S4-220539 |  |  |  | Additional and corrective text to TS 26.532 V1.0.0 in accordance with agreed pCRs in S4-220536, S4-220537, S4-220538 and S4-220539. | 1.1.0 |