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| Technical Specification |
| 3rd Generation Partnership Project;Technical Specification Group Services and System Aspects; Data Collection and Reporting;Protocols and Formats;(Release 17) |
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| ***3GPP***Postal address3GPP support office address650 Route des Lucioles - Sophia AntipolisValbonne - FRANCETel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16Internethttp://www.3gpp.org |
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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 in the clause 1, 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] OpenAPI: "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

# 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

DC-AF Data Collection AF

DC-Client Data Collection Client

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 Provisioning 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 *Provisioning Sessions API* are provided under clause 6.3.

A given instance of a Data Reporting Configuration resource is identified by the dataReportingConfigurationType and dataReportingConfigurationId properties of the DataReportingConfiguration resource, The properties of that resource, as described in the following sub-clauses, pertain to UE data collection and reporting by different Data Collection Clients to the Data Collection AF.

##### 4.2.3.3.2 Data Reporting Configuration types

The type of a Data Reporting Configuration resource is identified by the dataCollectionClientType property of the ProvisioningSession resource as specified in clause 6.2.3.

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

Editor’s Note: Define a common enumeration DataCollectionClientType in clause 5.4.

##### 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.

Editor’s Note: Describe key attributes of the Data Reporting Configuration resource here.

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

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 Reporting 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.

### 4.2.5 Configuration of Application Server

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.

### 4.2.6 Indirect data reporting

### 4.2.7 Reporting by Application Server

### 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 Reporting Client

A Direct Data Reporting 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 Reporting 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.

### 4.3.3 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].

## 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 DC-Client for subsequent reporting to the DC-AF.

# 5 General Aspects of APIs for Data Collection and Reporting

## 5.1 Overview

## 5.2 HTTP resource URIs and paths

## 5.3 Usage of HTTP

## 5.4 Common API data types

## 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 an Application Service Provider server to provision a data collection and reporting configuration in a Data Collection AF.

### 6.2.2 Resource structure

### 6.2.3 Data model

### 6.2.4 Mediation by NEF

## 6.3 Data Reporting Provisioning API

### 6.3.1 Overview

### 6.3.2 Resource structure

### 6.3.3 Data model

### 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 a Direct Data Collection Client, an Indirect Data Collection Client, or an Application Server to obtain a data collection and reporting configuration from the Data Collection AF.

### 7.2.2 Resource structure

### 7.2.3 Data Model

### 7.2.4 Mediation by NEF

## 7.3 Data Reporting API

### 7.3.1 Overview

This clause specifies the reporting API used by a Direct Data Collection Client, an Indirect Data Collection Client, or an Application Server to report UE data that has been collected to the Data Collection AF.

### 7.3.2 Resource structure

### 7.3.3 Data Model

### 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.

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

# A.1 General

This annex is based on the OpenAPI 3.0.0 specification [8] 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.

Annex <B> (informative):
<Informative annex for a Technical Specification>

Informative annexes may appear in both Technical Specifications and Technical Reports. Use style "Heading 8" for use in TSs.

Informative annexes shall not contain requirements for the implementation of the Technical Specification.

# B.1 Heading levels in an annex

Heading levels within an annex are used as in the main document, but for Heading level selection, the "A.", "B.", etc. are ignored. e.g. **B.1.2** is formatted using ***Heading 2*** style.

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 |