**3GPP TSG-CT3 Meeting #128 *C3-232083***

**Bratislava, Slovakia, 22nd May 2023 - 26th May 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.520** | **CR** | **0714** | **rev** | **-** | **Current version:** | **18.1.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Event muting enhancements for NWDAF Data Management subscriptions |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eNA\_Ph3 |  | ***Date:*** | 2023-05-14 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | 23.288 clause 6.2.7 and 23.502 clause 4.15.1 have been updated to define and use "Muting Exception instructions" together with the muting notification flag.According to the above clauses, these instructions may include the Event Producer NF "action on buffered notifications (Send All, Discard All, or Drop Old)" and the Event Producer NF "action on the subscription (close, continue with muting, continue without muting)", in the case of exceptions, while the response upon receiving such instructions may include muting settings ("the maximum number of notifications that the Event Producer NF expects to be able to store" and/or "an estimate of the duration for which notifications can be buffered"). 23.288 clause 6.2.7 also specifies that upon unacceptable muting notification flag or unacceptable muting instructions, the NF service producer shall send an error with an appropriate cause. |
|  |  |
| ***Summary of change:*** | Added Muting Exception instructions (in the subscription request) and Muting Notifications settings (in the response) which fulfil the above requirements.Added application error for not acceptable muting instructions.Added a new feature to cover data storage management enhancements. |
|  |  |
| ***Consequences if not approved:*** | Not fulfilled stage 2 requirements. |
|  |  |
| ***Clauses affected:*** | 4.4.2.2.2, 4.4.2.2.3, 5.3.6.2.2, 5.3.7.3, 5.3.8 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This CR does not impact any OpenAPI file. |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* \* First change \* \* \* \*

4.4.2.2.2 Subscription for data notifications

Figure 4.4.2.2.2-1 shows a scenario where the NF service consumer sends a request to the NWDAF to subscribe for data notification(s).

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**Figure 4.4.2.2.2-1: NF service consumer subscribes to data notifications**

The NF service consumer shall invoke the Nnwdaf\_DataManagement\_Subscribe service operation to subscribe to data notification(s). The NF service consumer shall send an HTTP POST request with "{apiRoot}/nnwdaf-datamanagement/<apiVersion>/subscriptions" as Resource URI representing the "NWDAF Data Management Subscriptions", as shown in figure 4.4.2.2.2-1, step 1, to create a subscription for an "Individual NWDAF Data Management Subscription" according to the information in message body.

The NnwdafDataManagementSubsc data structure provided in the request body shall include:

- an URI where to receive the requested notifications as "notificURI" attribute;

- notification correlation identfier within the "notifCorrId" attribute; and

- one of the following:

- analytics subscription information to be used to determine which data shall be collected and reported within the "anaSub" attribute;

- data subscription information within the "dataSub" attribute;

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

- the notification endpoints within the "notifEndpoints" attribute;

- formatting instructions within the "formatInstruct" attribute;

- processing instructions within the "procInstruct" attribute or the "multiProcInstructs" attribute if the "MultiProcessingInstruction" feature is supported;

- one of the following identifiers related to the ADRF:

- ADRF instance identifier within the "adrfId" attribute;

- ADRF set identifier within the "adrfSetId" attribute;

- one of the following target identifiers:

- NF instance identifier within the "targetNfId" attribute;

- NF set identifier within the "targetNfSetId" attribute;

- time window of the occurrence of the requested data collection within the "timePeriod” attribute;

- the purpose of data collection within the "dataCollectPurposes" attribute.

- the indication that the NF service consumer has already checked the user consent within the "checkedConsentInd" attribute.

Upon the reception of an HTTP POST request with: "{apiRoot}/nnwdaf-datamanagement/<apiVersion>/subscriptions" as Resource URI and NnwdafDataManagementSubsc data structure as request body, the NWDAF shall use the contents of the request to determine whether the subscription can already be served or interactions with the ADRF and/or data sources are required. If the NWDAF cannot use the contents of the request to determine this, the NWDAF shall send an HTTP "400 Bad Request" error response including the "cause" attribute set to "SUBSCRIPTION\_CANNOT\_BE\_SERVED".

NOTE 1: The "SUBSCRIPTION\_CANNOT\_BE\_SERVED" error can occur, for example, in the case where the "dataSub" or "anaSub" attributes are provided, when the request is syntactically valid and there is no NWDAF internal error, but the NWDAF can neither find an existing subscription to a data source nor construct one based on the received subscription contents.

If the user consent has not been checked by the NF service consumer and is required for the requested data collection depending on local policy and regulations, then the NWDAF shall check user consent for the targeted UE(s) by retrieving the user consent subscription data via the Nudm\_SDM service API of the UDM as described in clause 5.2.2 of 3GPP TS 29.503 [23]. If the NWDAF receives the response from the UDM that it is not granted for the impacted user(s), then the NWDAF shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "USER\_CONSENT\_NOT\_GRANTED".

NOTE 2: When the target of reporting is a SUPI or a GPSI then the subscription can be rejected, e.g. because user consent is not granted, and the error is sent to the consumer. When the target of reporting is an Internal Group Id, or a list of SUPIs/GPSI(s) or any UE, and the user consent is not granted for a subset of the impacted users, then no error is sent, but a subset of the SUPIs/GPSIs is skipped if user consent is not granted.

If the NWDAF determines that the subscription can already be served (without requiring further interactions with ADRF and/or data sources) or a successful response from the ADRF and/or data sources is received for the creation or modification of subscription(s) to serve this subscription, the NWDAF shall:

- create a new subscription;

- assign a subscriptionId;

- store the subscription.

If the NWDAF created an "Individual NWDAF Data Management Subscription" resource, the NWDAF shall respond with "201 Created" with the message body containing a representation of the created subscription, as shown in figure 4.4.2.2.2-1, step 2. The NWDAF shall include a Location HTTP header field. The Location header field shall contain the URI of the created subscription i.e. "{apiRoot}/nnwdaf-datamanagement/<apiVersion>/subscriptions/{subscriptionId}". If an immediate reporting indication is provided in the subscription, the NWDAF shall include the reports of the events subscribed, if available, in the HTTP POST response.

When the notification flag of the "dataSub" attribute (e.g. the "notifFlag" attribute within the "eventsRepInfo" attribute in the case of AF events) is included and set to "DEACTIVATE" in the request, the NWDAF shall mute the event notification and store the available events until the NF service consumer requests to retrieve them by setting the notification flag to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer). When a muting exception occurs, if the EnhDataMgmt feature is supported, the NWDAF may consider the contents of the muting instructions of the "dataSub" attribute (if provided; e.g. the "notifFlagInstruct" attribute within the "eventsRepInfo" attribute in the case of AF events) and/or local configuration to determine its actions.

If the EnhDataMgmt feature is supported and the NWDAF accepts the provided notification flag and muting instructions, it may indicate the applied muting notification settings in the response (e.g. within the "mutingSetting" attribute in the case of AF events). If the NWDAF does not accept the provided notification flag and muting instructions, it shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "MUTING\_INSTR\_NOT\_ACCEPTED".

If an error occurs when processing the HTTP POST request, the NWDAF shall send an HTTP error response as specified in clause 5.3.7.

\* \* \* \* Next change \* \* \* \*

4.4.2.2.3 Update subscription for data notifications

Figure 4.4.2.2.3-1 shows a scenario where the NF service consumer sends a request to the NWDAF to update the subscription for data notifications.

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**Figure 4.4.2.2.3-1: NF service consumer updates subscription to data notifications**

The NF service consumer shall invoke the Nnwdaf\_DataManagement\_Subscribe service operation to update subscription to data notifications. The NF service consumer shall send an HTTP PUT request with "{apiRoot}/nnwdaf-datamanagement/<apiVersion>/subscriptions/{subscriptionId}" as Resource URI representing the "Individual NWDAF Data Management Subscription", as shown in figure 4.4.2.2.3-1, step 1, to update the subscription for an "Individual NWDAF Data Management Subscription" resource identified by the {subscriptionId}. The NnwdafDataManagementSubsc data structure provided in the request body shall include the same contents as described in clause 4.4.2.2.2.

Upon the reception of an HTTP PUT request with: "{apiRoot}/nnwdaf-datamanagement/<apiVersion>/subscriptions/{subscriptionId}" as Resource URI and NnwdafDataManagementSubsc data structure as request body, the NWDAF shall use the contents of the request to determine whether the updated subscription can already be served or interactions with the ADRF and/or data sources are required. If the NWDAF cannot use the contents of the request to determine this, the NWDAF shall send an HTTP "400 Bad Request" error response including the "cause" attribute set to "SUBSCRIPTION\_CANNOT\_BE\_SERVED".

NOTE: The "SUBSCRIPTION\_CANNOT\_BE\_SERVED" error can occur, for example, in the case when the "dataSub" or "anaSub" attributes are provided, when the request is syntactically valid and there is no NWDAF internal error, but the NWDAF can neither find an existing subscription to a data source nor construct one based on the received subscription contents.

If the NWDAF determines that the updated subscription can already be served (without requiring further interactions with the ADRF and/or data sources) or a successful response from the ADRF and/or data sources is received for the creation or modification of subscription(s) to serve this subscription, the NWDAF shall:

- update the subscription of corresponding subscriptionId; and

- store the subscription.

If the NWDAF successfully processed and accepted the received HTTP PUT request, the NWDAF shall update an "Individual NWDAF Data Management Subscription" resource, and shall respond with:

a) HTTP "200 OK" status code with the message body containing a representation of the updated subscription, as shown in figure 4.4.2.2.3-1, step 2a; or

b) HTTP "204 No Content" status code, as shown in figure 4.4.2.2.3-1, step 2b.

When the notification flag of the "dataSub" attribute (e.g. the "notifFlag" attribute within the "eventsRepInfo" attribute in the case of AF events) is included in the request with the value "DEACTIVATE", the NWDAF shall mute the event notification and store the available events until the NF service consumer requests to retrieve them by setting the notification flag attribute to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer). When a muting exception occurs, if the EnhDataMgmt feature is supported, the NWDAF may consider the contents of the muting instructions of the "dataSub" attribute (if provided; e.g. the "notifFlagInstruct" attribute within the "eventsRepInfo" attribute in the case of AF events) and/or local configuration to determine its actions; if the notification flag is set to the value "RETRIEVAL", the NWDAF shall send the stored events to the NF service consumer, mute the event notification again and store available events; if the notification flag is set to the value "ACTIVATE" and the event notifications are muted (due to a previously received "DECATIVATE" value), the NWDAF shall unmute the event notification, i.e. start sending again notifications for available events.

If the EnhDataMgmt feature is supported and the NWDAF accepts the provided notification flag and muting instructions, it may indicate the applied muting notification settings in the response (e.g. within the "mutingSetting" attribute in the case of AF events). If the NWDAF does not accept the provided notification flag and muting instructions, it shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "MUTING\_INSTR\_NOT\_ACCEPTED".If errors occur when processing the HTTP PUT request, the NWDAF shall send an HTTP error response as specified in clause 5.3.7.

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

\* \* \* \* Next change \* \* \* \*

5.3.6.2.2 Type NnwdafDataManagementSubsc

**Table 5.3.6.2.2-1: Definition of type NnwdafDataManagementSubsc**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| adrfId | NfInstanceId | O | 0..1 | Identifier of the ADRF to be used by the NWDAF.If the subscription is for runtime analytics (i.e. the "timePeriod" attribute is either absent or contains a time window in the future) then the NWDAF shall store the notifications in this ADRF.If the subscription is for historical analytics (i.e. the "timePeriod" attribute contains a time window in the past) then the NWDAF shall retrieve the data from this ADRF. (NOTE 2) |  |
| adrfSetId | NfSetId | O | 0..1 | Identifier of the ADRF Set to be used by the NWDAF.If the subscription is for runtime analytics (i.e. the "timePeriod" attribute is either absent or contains a time window in the future) then the NWDAF shall store the notifications in this ADRF Set.If the subscription is for historical analytics (i.e. the "timePeriod" attribute contains a time window in the past) then the NWDAF shall retrieve the data from this ADRF Set. (NOTE 2) |  |
| anaSub | NnwdafEventsSubscription | C | 0..1 | Analytics subscription information to be used by the NWDAF to determine the data that is relevant to these analytics and shall thus be collected and reported, i.e. the “anaSub” attribute may be provided when the consumer requests from the NWDAF data that it needs in order to compute the analytics that is specified by the “anaSub” attribute.(NOTE 1) |  |
| checkedConsentInd | boolean | O | 0..1 | If set to "true", it indicates that the NF service consumer has already checked the user consent. The default value is "false". | UserConsent |
| dataCollectPurposes | array(DataCollectionPurpose) | O | 1..N | The purpose of data collection. This attribute may only be provided if user consent is required depending on local policy and regulations, and the consumer has not checked user consent. |  |
| dataSub | DataSubscription | C | 0..1 | Subscribed data events.(NOTE 1)(NOTE 6) |  |
| formatInstruct | FormattingInstruction | O | 0..1 | Formatting instructions to be used for sending event notifications. |  |
| notifCorrId | string | M | 1 | Notification correlation identifier. |  |
| notificURI | Uri | M | 1 | Notification target address. |  |
| notifEndpoints | array(NotifyEndpoint) | O | 1..N | The additional information of notification target address and correlation identifier. | EnDataCollect |
| procInstruct | ProcessingInstruction | O | 0..1 | Processing instructions to be used for sending event notifications.This attribute may only be provided if the "dataSub" attribute is provided. (NOTE 4) |  |
| multiProcInstructs | array(ProcessingInstruction) | O | 1..N | Processing instructions to be used for sending event notifications.This attribute may only be provided if the "dataSub" attribute is provided. (NOTE 4) | MultiProcessingInstruction |
| suppFeat | SupportedFeatures | C | 0..1 | This IE represents a list of Supported features as described in clause 5.3.8.(NOTE 5) |  |
| targetNfId | NfInstanceId | O | 0..1 | NF instance identifier to which the NWDAF shall create the requested subscription. (NOTE 2) |  |
| targetNfSetId | NfSetId | O | 0..1 | NF set identifier to which the NWDAF shall create the requested subscription. (NOTE 2) |  |
| timePeriod | TimeWindow | O | 0..1 | Represents a start time and a stop time during which data was collected or is requested to be collected. If this attribute is included, then the internal attributes of the data subscription that indicate a subscription duration (e.g. the "targetPeriod" attribute of an "eventSubs" attribute of an "smfDataSub" attribute, or the "monDur" attribute of the ReportingInformation data type) shall not be provided.(NOTE 3) |  |
| NOTE 1: Exactly one of these attributes shall be provided.NOTE 2: "targetNfId" and "targetNfSetId" are mutually exclusive. "adrfId" and "adrfSetId" are also mutually exclusive.NOTE 3: It includes the time period either in the past or in the future (i.e., start time as past time and stop time as future time is not allowed).NOTE 4: The "multiProcInstructs" attribute shall be used instead of the "procInstruct" attribute when the "MultiProcessingInstruction" feature is supported.NOTE 5 It shall be present in the POST request if at least one feature defined in clause 5.3.8 is supported, and it shall be present in the POST response if the NF service consumer includes the "suppFeat" attribute in the POST request.NOTE 6: The event reporting information within the "dataSub" attribute (e.g. "eventsRepInfo" attribute in the case of AF events) may include muting instructions (e.g. within the "notifFlagInstruct" attribute in the case of AF events) and/or muting notifications settings (e.g. within the "mutingSetting" attribute in the case of AF events) only if the EnhDataMgmt feature is supported. |

\* \* \* \* Next change \* \* \* \*

5.3.7.3 Application Errors

The application errors defined for the Nnwdaf\_DataManagement API are listed in table 5.3.7.3-1.

**Table 5.3.7.3-1: Application errors**

|  |  |  |
| --- | --- | --- |
| **Application Error** | **HTTP status code** | **Description** |
| SUBSCRIPTION\_CANNOT\_BE\_SERVED | 400 Bad Request | Indicates that the NWDAF cannot use the contents of the request to either a) determine whether the subscription can already be served or interactions with the ADRF and/or data sources are required or b) determine what interactions with the ADRF and/or data sources are required (if it has determined that they are required). |
| USER\_CONSENT\_NOT\_GRANTED | 403 Forbidden | Indicates that the request shall be rejected because an impacted user has not provided the required user consent. |
| MUTING\_INSTR\_NOT\_ACCEPTED | 403 Forbidden | Indicates that the muting instructions received by the NF service consumer cannot be accepted. |
| NOTE: Including a "ProblemDetails" data structure with the "cause" attribute in the HTTP response is optional unless explicitly mandated in the service operation clauses. |

\* \* \* \* Next change \* \* \* \*

5.3.8 Feature negotiation

The optional features in table 5.3.8-1 are defined for the Nnwdaf\_DataManagement API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [6].

**Table 5.3.8-1: Supported Features**

|  |  |  |
| --- | --- | --- |
| **Feature number** | **Feature Name** | **Description** |
| 1 | MultiProcessingInstruction | Indicates the support of multiple processing instructions. |
| 2 | UserConsent | Indicates the support of detailed handling of user consent, e.g. indications that user consent has been checked and error responses related to the lack of user consent. |
| 3 | EnhDataMgmt | Indicates the support of enhanced data management mechanisms. |

\* \* \* \* End of changes \* \* \* \*