**3GPP TSG-SA WG2 Meeting #143E *<TDoc#>***

**e-meeting, February 24 – March 9, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.288** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | **<Version#>** |  |
|  | | | | | | | | |
| *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 |  |

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|  | | | | | | | | | | |
| ***Title:*** | Register NWDAF supporting UE into UDM | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNA\_Ph2 | | | | |  | ***Date:*** | | | <Res\_date> |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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 can be 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In a multiple NWDAF deployement (incuding selection and re-selection of NWDAFs with overlapping serving areas), make it possible for collecting UE related data from NWDAFs, assure the same NWDAF is used for multiple NWDAF consumers and for an NWDAF consumer to be able to request statistics (Analytics in the past). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | When an NWDAF starts to serve a UE, introduce NWDAF registering into UDM the UE it serves. And then deregister it when stop serving the UE. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Not possible to in an effective way collect UE related data, and request statistics in a multiple NWDAF deployment. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1.1.1, 6.1.2.1 and 6.2.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS 23.502 CR TBD... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* Start of Changes \* \* \* \*

### 6.1.1 Analytics Subscribe/Unsubscribe

#### 6.1.1.1 Analytics subscribe/unsubscribe by NWDAF service consumer

This procedure is used by any NWDAF service consumer (e.g. including NFs/OAM) to subscribe/unsubscribe at NWDAF to be notified on analytics information, using Nnwdaf\_AnalyticsSubscription service defined in clause 7.2. This service is also used by an NWDAF service consumer to modify existing analytics subscription(s). Any entity can consume this service as defined in clause 7.2.



Figure 6.1.1.1-1: Network data analytics Subscribe/unsubscribe

1. The NWDAF service consumer subscribes to or cancels subscription to analytics information by invoking the Nnwdaf\_AnalyticsSubscription\_Subscribe/ Nnwdaf\_AnalyticsSubscription\_Unsubscribe service operation. The parameters that can be provided by the NWDAF service consumer are listed in clause 6.1.3.

When a subscription to analytics information is received, the NWDAF determines whether triggering new data collection is needed.

If the service invocation is for a subscription modification, the NF service consumer includes an identifier (Subscription Correlation ID) to be modified in the invocation of Nnwdaf\_AnalyticsSubscription\_Subscribe.

2. When NWDAF is selected by NWDAF service consumer and starts collecting data and/or performing analytics for the UE NWDAF register the served UE into UDM, by sending the UE ID and NWDAF ID.

When the NWDAF stops serving the UE it deregisters the UE from UDM.

3. If NWDAF service consumer subscribes to analytics information, the NWDAF notifies the NWDAF service consumer with the analytics information by invoking Nnwdaf\_AnalyticsSubscription\_Notify service operation, based on the request from the NWDAF service consumer, e.g. Analytics Reporting Parameters.

\* \* \* Next Change \* \* \* \*

#### 6.1.2.1 Analytics request by NWDAF service consumer

This procedure is used by the NWDAF service consumer (e.g. including NFs/OAM) to request and get from NWDAF analytics information, using Nnwdaf\_AnalyticsInfo service defined in clause 7.3.



Figure 6.1.2.1-1: Network data analytics Request

1. The NWDAF service consumer requests analytics information by invoking Nnwdaf\_AnalyticsInfo\_Request service operation. The parameters that can be provided by the NWDAF service consumer are listed in clause 6.1.3.

When a request for analytics information is received, the NWDAF determines whether triggering new data collection is needed.

2. When NWDAF is selected by NWDAF service consumer and it does not imediately have the response available NWDAF register the served UE into UDM, by sending the UE ID and NWDAF ID.

When the NWDAF stops serving the UE it deregisters the UE from UDM.

3. The NWDAF responds with analytics information to the NWDAF service consumer.

\* \* \* Next Change \* \* \* \*

## 6.x Procedures for re-selection of NWDAF

### 6.x.1 NWDAF service consumer is not changed

At re-selection without consumer change, the old NWDAF deregisters the UE from UDM and the new NWDAF registers into UDM, which is described in clause 6.1.1Analytics Subscribe/Unsubscribe.

\* \* \* Next Change \* \* \* \*

### 6.2.2 Data Collection from NFs

#### 6.2.2.1 General

The Data Collection from NFs is used by NWDAF to subscribe/unsubscribe at any 5GC NF to be notified for data on a set of events.

The Data Collection from NFs is based on the services of AMF, SMF, UDM, PCF, NRF and AF (possibly via NEF):

- Event Exposure Service offered by each NF as defined in TS 23.502 [3] clause 4.15 and clause 5.2.

- other NF services (e.g. Nnrf\_NFDiscovery and Nnrf\_NFManagement in NRF as defined in TS 23.502 [3] clause 4.17)

This data collection service is used directly in order to retrieve behaviour data for individual UEs or groups of UEs (e.g. UE reachability), and also to retrieve global UE information (e.g. Number of UEs present in a geographical area).

Table 6.2.2.1-1: NF Services consumed by NWDAF for data collection

|  |  |  |
| --- | --- | --- |
| Service producer | Service | Reference in TS 23.502 [3] |
| AMF | Namf\_EventExposure | 5.2.2.3 |
| SMF | Nsmf\_EventExposure | 5.2.8.3 |
| PCF | Npcf\_EventExposure (for a group of UEs or any UE)  Npcf\_PolicyAuthorization\_Subscribe (for a specific UE) | 5.2.5.7 |
| UDM | Nudm\_EventExposure | 5.2.3.5 |
| NEF | Nnef\_EventExposure | 5.2.6.2 |
| AF | Naf\_EventExposure | 5.2.19.2 |
| NRF | Nnrf\_NFDiscovery | 5.2.7.3 |
|  | Nnrf\_NFManagement | 5.2.7.2 |

NOTE 1: The present document specifies that NWDAF can collect some UPF input data for deriving analytics, but how NWDAF collects these UPF input data is not defined in this Release of the specification.

NOTE 2: There is no data collected from the PCF by the NWDAF defined in this Release of the specification.

To retrieve data related to a specific UE, the NWDAF shall first determine which NF instances are serving this UE as stated in table 6.2.2.1-2 unless the NWDAF has already obtained this information due to recent operations related to this UE.

Table 6.2.2.1-2: NF Services consumed by NWDAF to determine which NF instances are serving a UE

| Type of NF instance (serving the UE) to determine | NF to be contacted by NWDAF | Service | Reference in TS 23.502 [3] |
| --- | --- | --- | --- |
| UDM | NRF | Nnrf\_NFDiscovery | 5.2.7.3 |
| AMF | UDM | Nudm\_UECM | 5.2.3.2 |
| SMF | UDM | Nudm\_UECM | 5.2.3.2 |
| BSF | NRF | Nnrf\_NFDiscovery | 5.2.7.3 |
| PCF | BSF | Nbsf\_Management | 5.2.13.2 |
| NEF | NRF | Nnrf\_NFDiscovery | 5.2.7.3 |
| NWDAF | UDM | Nudm\_UECM | 5.2.3.2 |

The UDM instance should be determined using NRF as described in clause 4.17.4 of TS 23.502 [3] and factors to determine as described in clause 6.3.8 of TS 23.501 [2].

The AMF, SMF instances should be determined using a request to UDM providing the SUPI or the group identity. To determine the SMF serving a PDU session, the NWDAF should in addition provide the DNN and S-NSSAI of this PDU Session; otherwise the NWDAF will obtain a list of possibly multiple SMFs (e.g. one per PDU session).

The BSF instance should be discovered using NRF thanks to optional request parameters (e.g. DNN list, IP domain list, IPv4 address range, IPv6 prefix range) as stated in clause 4.17.4 of TS 23.502 [3], or based on local configuration at the NWDAF.

The PCF instance serving UE PDU Session(s) should be determined using a request to BSF with the allocated UE address, DNN and S-NSSAI.

When NWDAF receives a request addressed to an Internal Group ID from a consumer, NWDAF may need to initiate data collection from several 5GC NFs, such as AMF, SMF, UDM, PCF, NEF/AF, etc. NWDAF may first discover the instances of the required 5GC NFs deployed in the network, e.g. by querying NRF.

For discovering the UDM, NWDAF can query the NRF with the Internal Group ID as the target of the query. For discovering AMF, SMF, PCF, NEF, and AF, NWDAF may need to discover all the instances in the network by using the Nnrf\_NFDiscovery service.

NOTE 3: It is assumed that all members of an Internal Group ID belong to the same UDM Group ID. NWDAF can select a UDM instance supporting the UDM Group ID of the Internal Group ID.

Then, if data needs to be collected from AMF, SMF, UDM, and PCF, NWDAF may initiate the data collection with the Internal Group ID as the target, e.g. subscribing to the event exposure in all the instances of a given type of network function. This subscription to all the instances of required source of event exposure handles, e.g. mobility of UEs across AMFs, or initiation of new PDU sessions with different allocated SMFs.

For collecting data from AMF and SMF, NWDAF may collect the data directly from AMF and/or SMF, or indirectly via UDM, according to TS 23.502 [3] clause 4.15.3.2.3.

The NWDAF determines to collect data from a trusted AF supporting specific Event ID(s) and serving specific application(s) based on internal configuration.

The NEF instance that is serving a specific network slices and/or applications of a UE should be determined using NRF using optional request parameters as defined in clause 6.3.14 of TS 23.501 [2]

If NWDAF needs to collect data from an AF deployed outside the operator's domain, the NWDAF shall contact NEF with a SUPI or Internal Group ID as the target of the data collection. NEF is responsible for translation of SUPI to GPSI, or internal to external group identifiers, by querying UDM, prior to contacting the AF.

To retrieve required data for any UE, the NWDAF may subscribe to events from the AMF and/or SMF instances it has determined, setting the target of event reporting to "any UE" and the event filter(s) according to the Analytics Filter Information. Alternatively, if the required data is communication related and for any UE within an Area of interest, the NWDAF can obtain from the AMF instances it has determined a list of UEs located within the Area of Interest. Based on the obtained UE list, for each UE in the list, the NWDAF retrieves the SMF serving the UE and the NWDAF subscribes to data from the relevant SMF per each specific UE.

To retrieve data related to "any UE" based on analytics filter information, the NWDAF shall first determine which NF instances are matching the analytics filter information (see clause 6.7.5.1) as stated in table 6.2.2.1-3 unless the NWDAF has already obtained this information due to recent operations related to this analytics filter information.

Table 6.2.2.1-3: NF Services consumed by NWDAF to determine which NF instances are matching analytics filters

| Type of NF instance (matching analytics filters) to determine | NF to be contacted by NWDAF | Service | Reference in TS 23.502 [3] |
| --- | --- | --- | --- |
| AMF, SMF | NRF | Nnrf\_NFDiscovery | 5.2.7.3 |

\* \* \* End of Changes \* \* \* \*