**SA WG2 Meeting #143E e-meeting *S2-210xxxx***

**Elbonia, February 24 – March 09, 2021**

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| *CR-Form-v11.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.288** | **CR** |  | **rev** | **-** | **Current version:** | **16.6.0** |  |
|  | | | | | | | | |
| *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:*** | Slice load level related network data analytics | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung, KDDI, CATT, NTT DOCOMO | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNA\_Ph2 | | | | |  | | ***Date:*** | | 2021-18-02 |
|  |  | | | |  | | |  | |  |
| ***Category:*** | **C** |  | | | | | | ***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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This CR introduces the definition of slice load analytics, which had been missing from Rel-16 specifications despite the existence of a related clause. The input data, output analytics and procedures are all taken from the conclusion of the study of KI#4 pointing to Sol#2, captured in clauses 8.4 and 6.2 of TR 23.700-91, respectively. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Change includes input data description, output analytics by NWDAF, and proocedure required for delivery of analytics | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Study conclusion would not be respected; slice load analytics would continue un-specified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3.1, 6.3.2, 6.3.2A, 6.3.3, 6.3.3A, 6.3.X | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | |  | | | |
| ***Other specs*** | |  | **X** | Other core specifications | | |  | | | |
| ***affected:*** | |  | **X** | Test specifications | | |  | | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | |  | | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |

\* \* \* \* Start of Change \* \* \* \*

## 6.3 Slice load level related network data analytics

### 6.3.1 General

The NWDAF provides slice load level information to a consumer NF (e.g. AMF or NSSF) on a Network Slice level or a Network Slice instance level or both. The NWDAF is not required to be aware of the current subscribers using the slice. The NWDAF notifies slice specific network status analytics information to the consumer NF that is subscribed to it. A consumer NF may collect directly slice specific network status analytics information from NWDAF. This information is not subscriber specific.

The NWDAF services as defined in the clause 7.2 and clause 7.3 are used to expose slice load level analytics from the NWDAF to the consumer NF (e.g. PCF, NSSF or AMF).

The following Analytics ID is used for the slice load level related network data analytics:

- Load level information

The following Analytics Filters can be included by the consumer in the related Nnwdaf\_AnalyticsSubscription\_Subscribe and Nnwdaf\_AnalyticsInfo\_Request service operation:

- S-NSSAI and NSI ID.

NOTE: The use of NSI ID in the network is optional and depends on the deployment choices of the operator. If used, the NSI ID is associated with S-NSSAI.

- Area of Interest.

- optionally, Load Level Threshold value.

### 6.3.2 Input data

Table 6.3.2-1: Input data for slice load analytics

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| --- | --- | --- |
| Information | Source | Description |
| Timestamps | 5GC NF | A time stamp associated with the collected information. |
| UE registrations on a Network Slice/Network Slice instance | AMF, OAM | Current number of UEs registered in a NW slice or NW slice instance |
| PDU session establishments on a Network Slice/Network Slice instance | SMF, OAM | Current number of established PDU sessions in a NW slice or NW slice instance. |
| Load of NFs associated to Network Slice instance | OAM, NRF | Resource utilization information of a Network Slice instance obtained from its constituent NF instances. NF instance load input data collection is described in clause 6.5, Table 6.5.2-1. |
| Traffic usage | UPF | Report of user plane traffic in the UPF for the accumulated usage of network resources (see TS 29.244 [17]) |

NOTE: How NWDAF collects traffic usage will not be defined in Rel-17.

### 6.3.3 Output analytics

The NWDAF services as defined in the clause 7.2 and 7.3 are used to expose the following analytics.

- Network Slice load statistics information is defined in Table 6.3.3-1.

- Network Slice instance load statistics information is defined in Table 6.3.3-2.

- Network Slice load predictions information is defined in Table 6.3.3-3.

- Network Slice instance load predictions information is defined in Table 6.3.3-4.

Table 6.3.3-1: Network Slice instance load statistics

|  |  |
| --- | --- |
| Information | Description |
| S-NSSAI | Identification of the Network Slice |
| Network Slice instances (1,…,max) | List of Network Slice instance(s) within the S-NSSAI |
| > NSI ID | Identification of the Network Slice instance |
| > Number of UE Registrations | Number of UE registrations of the NSI |
| > Number of PDU Sessions establishment | Number of PDU Session establishments of the NSI |
| > Resource usage | The usage of assigned virtual resources currently in use for the NF instances (mean usage of virtual CPU, memory, disk) as defined in TS 28.552 [19] clause 5.7, belonging to a particular Network Slice instance. |
| > Resource usage threshold crossings (optional) | Number of resource usage threshold crossings on the Network Slice instance provided if threshold is provided by the consumer as Analytics Filter. |
| > Resource usage threshold crossings time period (1,…,max) (optional) | Resource usage threshold crossing vector including time elapsed between each threshold crossing on the Network Slice instance provided if threshold is provided by the consumer as Analytics Filter. |

Table 6.3.3-2: Network Slice load statistics

|  |  |
| --- | --- |
| Information | Description |
| S-NSSAI | Identification of the Network Slice |
| > Number of UE Registrations | Number of UE registrations of the Network Slice |
| > Number of PDU sessions establishments | Number of PDU Session establishments of the Network Slice |

Table 6.3.3-3: Network Slice instance load predictions

|  |  |
| --- | --- |
| Information | Description |
| S-NSSAI | Identification of the Network Slice |
| Network Slice instances (1,…,max) | List of Network Slice instance(s) within the S-NSSAI |
| > NSI ID | Identification of the Network Slice instance |
| > Number of UE Registrations | Number of UE registrations of the NSI |
| > Number of PDU Sessions establishment | Number of PDU Session establishments of the NSI |
| > Resource usage | The usage of assigned virtual resources currently in use for the NF instances (mean usage of virtual CPU, memory, disk) as defined in TS 28.552 [19] clause 5.7, belonging to a particular Network Slice instance. |
| > Resource usage threshold crossings (optional) | Number of resource usage threshold crossings on the Network Slice instance provided if threshold is provided by the consumer as Analytics Filter. |
| > Resource usage threshold crossings time period (1,…,max) (optional) | Resource usage threshold crossing vector including time elapsed between each threshold crossing on the Network Slice instance provided if threshold is provided by the consumer as Analytics Filter. |
| > Probability assertion | Confidence of this prediction. |

Table 6.3.3-4: Network Slice load predictions

|  |  |
| --- | --- |
| Information | Description |
| S-NSSAI | Identification of the Network Slice |
| > Number of UE Registrations | Number of UE registrations of the Network Slice |
| > Number of PDU sessions establishments | Number of PDU Session establishments of the Network Slice |
| > Probability assertion | Confidence of this prediction. |

NOTE: If Network Slice instances are not deployed, slice load level related output analytics are provided according to Tables 6.3.3-2 and 6.3.3-4.

### 6.3.X Procedures



Figure 6.3.4-1: Network Slice load analytics provided by NWDAF

Figure 6.3.4-1 shows the procedure for NWDAF to derive slice load analytics. The steps are described as follows:

1. A consumer NF subscribes to/requests a NWDAF using Nnwdaf\_AnalyticsSubscription\_Subscribe or Nnwdaf\_AnalyticsInfo\_Request service operation (Analytics ID = Load level information and a set of Event Filters (e.g. S-NSSAI, NSI ID, Area of Interest)).

2. [OPTIONAL] If the NWDAF does not have already the slice information, it gains the slice information from OAM (as described in clause 6.2.3.x) and discovers from NRF the AMF, SMF and NSSF instance(s) relevant to the Analytics Filters provided in the analytics subscription.

3. [OPTIONAL] If the NSI ID(s) are not provided in the analytics subscription by the consumer NF, the NWDAF invokes Nnssf\_NSSelection\_Get service operation from NSSF to obtain the NSI ID(s) corresponding to the S-NSSAI in the subscription.

4a. The NWDAF subscribes to input data from the OAM following the procedure captured in clause 6.2.3.2.

4b. [OPTIONAL] The NWDAF may collect input data from the NRF (see clause 6.5) to derive slice instance resource usage statistics and predictions for a Network Slice instance.

5. The NWDAF subscribes to the AMF's event exposure service to collect data on the number of UEs currently registered on certain Network Slice and, if available, its constituent Network Slice instance(s). An UE access and mobility information event using event ID "UE moving in or out of Area of Interest" is used for that purpose as defined in TS 23.502 [3] using as Event Filters Area of Interest, S-NSSAI and, if available, NSI ID(s). If required, the NWDAF may also collect the corresponding UE IDs.

6. The NWDAF subscribes to the SMF's event exposure service to collect data on the number of PDU sessions currently registered on certain Network Slice and, if available, its constituent Network Slice instance(s). A PDU Session establishment/release related event is use for that purpose as defined in TS 23.502 [3].

7. The NWDAF derives slice load analytics.

8. The NWDAF delivers analytics to the consumer NF by invoking Nnwdaf\_AnalyticsSubscription\_Notify or Nnwdaf\_AnalyticsInfo\_Request response service operations

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