**3GPP TSG-SA5 Meeting #131eS5-203303**

**e-meeting, 25 May – 3 June 2020**

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| *CR-Form-v11.4* |
| **CHANGE REQUEST** |
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|  | **28.554** | **CR** | **0053** | **rev** | **-** | **Current version:** | **16.4.0** |  |
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| *For* [***HELP***](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 | **X** | Core Network | **X** |

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| ***Title:***  | Cleanup based on refined slice definitions |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | S5 |
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| ***Work item code:*** | TEI16 |  | ***Date:*** | 2020-05-15 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | network slice instance ( or NSI) is used in many places of this specification, but for different purposes. 1. In some places, NSI is used to represent Network Slice2. In other places, NSI is used to represent Managed Object Instance of NetworkSlice IOC. |
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| ***Summary of change:*** | 1. Replace “network slice instance (or NSI)” with “Network Slice” if the NSI is used to represent Network Slice2. Replace “network slice instance (or NSI)” with NetworkSlice instance or MOI of NetworkSlice if the NSI is used to represent Managed Object Instance of NetworkSlice Information Object Class. |
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| ***Consequences if not approved:*** | Mis-using network slice instance caused conceptual issues inside and outside 3GPP, and let existing specification not implementable. |
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| ***Clauses affected:*** | 2, 6.2.1, 6.2.2, 6.2.3, 6.3.2, 6.3.3, 6.4.1, 6.4.2, A.2, A.3, A.4, A.5, A.6, A.7 |
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|  | **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 ...  |
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| ***Other comments:*** |  |

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| **Start of 1st modification** |

# 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] Void.

[3] ITU-T Recommendation E.800: "Definitions of terms related to quality of service".

[4] 3GPP TS 24.501: " Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[5] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[6] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[7] 3GPP TS 23.501: " System Architecture for the 5G System; Stage 2".

[8] ETSI ES 203 228 V1.2.1 (2017-04): "Environmental Engineering (EE); Assessment of mobile network energy efficiency".

[9] 3GPP TS 28.310: "Management and orchestration; Energy efficiency of 5G".

## 6.2.1 Registered subscribers of network and network slice through AMF

a) AMFRegNbr.

b) This KPI describe the total number of subscribers that are registered to a network slice. It is obtained by counting the subscribers in AMF that are registered to a network slice. It is an Integer. The KPI type is CUM.

c) 

d) SubNetwork, NetworkSlice

## 6.2.2 Registered subscribers of network and network slice through UDM

a) UDMRegNbr.

b) This KPI describe the total number of subscribers that are registered to a network slice. It is corresponding to the measurement RM.RegisteredSubUDMNbrMean that counts subscribers registered in UDM. It is an Interger. The KPI type is CUM.

c) 

d) SubNetwork, NetworkSlice

## 6.2.3 Registration success rate of one single network slice

a) RegSR.

b) This KPI describes the ratio of the number of successfully performed registration procedures to the number of attempted registration procedures for the AMF set which related to one single network slice and is used to evaluate accessibility provided by the end-to-end network slice and network performance. It is obtained by successful registration procedures divided by attempted registration procedures. It is a percentage. The KPI type is RATIO.

c)



Note: Above measurements with subcounter .*Type* should be defined in 3GPP TS 24.501 [4].

d) NetworkSlice

### 6.3.2 Upstream throughput for network and Network Slice Instance

a) UpstreanThr.

b) This KPI describes the upstream throughput of one single network slice by computing the packet size for each successfully transmitted UL IP packet through the network slice during each observing granularity period and is used to evaluate integrity performance of the end-to-end network slice. It is obtained by upstream throughput provided by N3 interface from NG-RAN to all UPFs which are related to the single network slice. The KPI unit is kbit/s and the KPI type is CUM.

c) 

d) NetworkSlice, SubNetwork.

### 6.3.3 Downstream throughput for Single Network Slice Instance

a) DownstreamThr..

b) This KPI describes the downstream throughput of one single network slice by computing the packet size for each successfully transmitted DL IP packet through the network slice during each observing granularity period and is used to evaluate integrity performance of the end-to-end network slice. It is obtained by downstream throughput provided by N3 interface from all UPFs to NG-RAN which are related to the single network slice. The KPI unit is kbit/s and the KPI type is CUM.

c) $DTSNSI= \sum\_{UPF}^{}GTP.OutDataOctN3UPF$

d) NetworkSlice.

### 6.4.1 Mean number of PDU sessions of network and network Slice Instance

a) PDUSesMeanNbre.

b) This KPI describes the mean number of PDU sessions that are successfully established in a network slice. It is obtained by successful PDU session establishment procedures of SMFs which is related to the network slice. It is an integer. The KPI type is MEAN.

c) PDUSesMeanNbr=Sum (SM.SessionNbrMean.SNSSAI) over SMFs.

d) NetworkSlice

### 6.4.2 Virtualised Resource Utilization of Network Slice Instance

a) VirtualResUtilizaiton.

b) This KPI describes utilization of virtualised resource (e.g. processor, memory, disk) that are allocated to a network slice. It is obtained by the usage of virtualised resource (e.g. processor, memory, disk) divided by the system capacity that allocated to the network slice. It is a percentage, The KPI type is Ratio.

Note: In the present document, this KPI is for the scenario when NF is not shared between different network slice.

c)

d) NetworkSlice

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| **End of 1st modification** |

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| **Start of 2nd modification** |

# A.2 Use case for number of registered subscribers of single network-slice- related KPI

Number of registered subscribers of single network slice can be used to describe the amount of subscribers that are successfully registered, it can reflect the usage of network slice, It is useful to evaluate accessibility performance provided by one single network slice which may trigger the lifecycle management of the network slice, this kind of KPI is valuable especially when network functions (e.g. AMF) are shared between different network slice. This KPI is focusing on both network and user view.

# A.3 Use case for upstream/downstream throughput for one-single-network-slice-related KPI

Measuring throughput is useful to evaluate system load of end to end network slice. If the throughput of the specific network slice cannot meet the performance requirement, some actions need to be performed to the network slice e.g. reconfiguration, capacity relocation. So it is necessary to define the IP throughput for one single network slice. This KPI is focusing on network and user view.

# A.4 Use case for mean PDU sessions number in network slice

It is necessary to evaluate the mean PDU session number in the network slice to indicate system load level. For example, if the mean value of the PDU sessions is high, maybe the system capacity should be increased. This KPI is focusing on network view.

# A.5 Use case for virtualised resource utilization of network-slice-related KPI

It is necessary to evaluate the current utilization of virtualised resources (e.g. memory and storage utilization) that a network slice is occupied. If the utilization is larger or smaller than the threshold, maybe some scale in/out operations will be made by the management system. This KPI is focusing on network and user view.

# A.6 Use case for 5GS registration success rate of one single-network-slice-related KPI

It is necessary to evaluate accessibility performance provided by 5GS. 5GS registration for a UE is important when they have registered to the network slice. If users or subscribers cannot register to the network slice, they cannot access any network services in the network slice. This KPI is focusing on network view.

# A.7 Use case for RAN UE throughput-related KPI

The UE perceived throughput in NG-RAN is an important performance parameter for operating 5G network. If the UE throughput of the NR cell cannot meet the performance requirement, some actions need to be performed to the network, e.g. reconfiguration or capacity increase. So it is necessary to define UE throughput KPI to evaluate whether the end-users are satisfied. The KPI covers volume large enough to make the throughput measurement relevant, i.e. excluding data volume of the last or only slot.

The UE throughput KPI covers also "NR option 3" scenarios. Then the gNB is "connected" towards the EPC, and not towards 5GC.

It is proposed to allow the KPI separated based on mapped 5QI (or for QCI in case of NR option 3).

When network slicing is supported by the NG-RAN, multiple network slices may be supported. The UL and DL UE throughput for each network slice is then of importance to the operator to pinpoint a specific performance problem.

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| **End of 2nd modification** |