**3GPP SA4 #124 S4-231029**

**Berlin, 22-26 May 2023**

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| *CR-Form-v12.0* |
| **PSEUDO CHANGE REQUEST** |
|  |
|  | **26**.**806** | **CR** | pseudo | **rev** | **-** | **Current version:** | **1.2.0** |  |
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| *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:***  | **[FS\_SmarTAR] Methods for achieving desired end-to-end packet error rate and bit rate** |
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| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | FS\_SmarTAR |  | ***Date:*** | 24/05/2023 |
|  |  |  |  |  |
| ***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-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)* *Rel-17 (Release 17)* *Rel-18 (Release 18)* |
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| ***Reason for change:*** | The TR26.806 mentioned end-to-end QoS metrics including packet error rate and bit rate without saying whether it is feasible to provision such QoS metrics. |
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| ***Summary of change:*** | Providing potential solutions for achieving desired end-to-end packet error rate and bit rate.  |
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| ***Consequences if not approved:*** | The TR is not complete without the proposed change. |
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| ***Clauses affected:*** |  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**===== BEGIN OF CHANGE =====**

#### 6.1.2.2 Other End-to-end QoS metrics

For other end-to-end QoS metrics, such as packet error rate and bit rate, the 5G network can adjust the metrics within the 5G network to achieve desired end-to-end QoS.

First, consider the packet error rate. Assuming that the packet error rate in the 5G network (denoted ) and the effective packet error rate in the non-5G networks (denoted ) are independent, the end-to-end packet error rate (denoted ) is then

This suggests that if can be estimated, then the 5G network can adjust to achieve a desired value for The above equation also suggests a method to estimate : if is measured, then can be solved for as

Thus a method for the 5G network to set a packet loss rate to achieve a desired end-to-end packet loss rate is as follows:

1. The 5G network estimates the packet error rate in the 5G network .
2. The end-to-end packet error rate is measured, e.g., by using the RTP sequence numbers.
3. The collective packet error rate of the non-5G networks is computed according to
4. The 5G network adjusts the packet error rate within the 5G network to to meet the desired end-to-end packet error rate

UE can report the desired end-to-end packet error rate to the AF, which then passes it to the PCF. The PCF can determine the packet error rate for the RAN and the packet error rate for the 5GC and signal them to the gNB and the UPF respectively. The gNB and the UPF enforce the packet error rates respectively.

Note that to measure the end-to-end packet error rate, the required number of packets increases as the packet error rate decreases. For example, if the end-to-end packet error rate is 0.1%, there is one packet error event expected to occur in 1000 packets. This implies a slow response when the packet error rate is low. This is different from delay measurement, where a single packet can provide a valid measurement regardless of the range of the delay.

Next consider the bit rate. The bit rate depends on the bit rate allocation of the network segments in the end-to-end path and rate control and congestion control. However, there is a simple relationship among the maximum allowed bit rates that can be exploited to determine the bit rate allocation. It is observed that the maximum allowed end-to-end bit rate () is the minimum of the maximum allowed bit rate in the 5G network () and the maximum allowed bit rate in the non-5G networks (, i.e., . Thus the 5G network only needs to provide an maximum allowed bit rate that is higher than the desired end-to-end bit rate.

**===== END of CHANGE =====**