**3GPP TSG- Meeting # *rev1***

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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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 | **x** | Core Network |  |

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| ***Title:***  |  |
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| ***Source to WG:*** | , Intel |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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:*** | Measurement name for the KPI named “Integrated downlink delay in RAN” is not correct. The text and measurement name are sometime using latency instead of delay. Further optional sub-counters per QoS and per S-NSSAI is missing in the definition.  |
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| ***Summary of change:*** | The subsection 6.3.1 has been updated to cover latency and delay KPIs.The KPI named “Integrated downlink delay in RAN” is split into: * Three KPIs for gNB-DU
* Three KPIs for gNB-CU-UP
* Two KPIs for “Integrated uplink delay in RAN”.

Subcounters has been added for QoS and S-NSSAI. Measurement unit aligned to the agreed 0.1 ms. |
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| ***Consequences if not approved:*** | It will not be possible to monitor the KPI named “Integrated downlink delay in RAN” per QoS and S-NSSAI. |
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| ***Clauses affected:*** | 6.3.1, 6.3.1.2, 6.3.1.2.x (new), 6.3.1.z (new), 6.3.1.z.1 (new), 6.3.1.z.2 (new), 6.3.1.z.3 (new), 6.3.1.f (new), 6.3.1.f.1 (new), 6.3.1.f.2 (new), 6.3.1.f.3 (new)  |
|  |  |
|  | **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:*** | This is a merge of S5-203055 (Intel) into S5-203278 (Ericsson) |
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| ***This CR's revision history:*** |  |

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| **1st modified section** |

## 6.3 Integrity KPI

### 6.3.1 Latency and Delay of 5G network

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| **Next modified section** |

#### 6.3.1.2 Integrated downlink delay in RAN

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| **Next modified section** |

##### 6.3.1.2.x Downlink delay in NG-RAN for a sub-network

a) DLDelay\_NR\_SNw.

b) This KPI describes the average packet transmission delay through the RAN part to the UE. It is used to evaluate delay performance of NG-RAN in downlink for a sub-network. It is the weighted average packets delay from reception of IP packet in gNB-CU-UP until the last part of an RLC SDU packet was received by the UE according to received HARQ feedback information for UM mode or until the last part of an RLC SDU packet was received by the UE according to received RLC ACK for AM mode. It is a time interval (0.1 ms). The KPI type is MEAN. This KPI can optionally be split into KPIs per QoS level (mapped 5QI or QCI in NR option 3) and per S-NSSAI.

c) Below are the equations for average “Integrated downlink delay in RAN” for this KPI on SubNetwork level. The “Integrated downlink delay in RAN” is the sum of average DL delay in gNB-CU-UP of the sub-network (DLDelay\_gNBCUUP\_SNw) and the average DL delay in gNB-DU of the sub-network (DLDelay\_gNBDU\_SNw):

DLDelay\_NR\_SNw = DLDelay\_gNBCUUP\_SNw + DLDelay\_gNBDU\_SNw

or optionally DLDelay\_ NR\_SNw.*QOS* = DLDelay\_gNBCUUP\_SNw.*QOS* + DLDelay\_gNBDU\_SNw.*QOS* where *QOS* identifies the target quality of service class.

or optionally DLDelay\_NR\_SNw.*SNSSAI* = DLDelay\_gNBCUUP\_SNw.*SNSSAI* + DLDelay\_gNBDU\_SNw.*SNSSAI* where *SNSSAI* identifies the S-NSSAI.

d) SubNetwork

##### 6.3.1.2.y Downlink delay in NG-RAN for a network slice subnet

a) DLDelay\_NR\_Nss.

b) This KPI describes the average packet transmission delay through the RAN part to the UE. It is used to evaluate delay performance of NG-RAN in downlink for a network slice subnet. It is the weighted average packets delay from reception of IP packet in gNB-CU-UP until the last part of an RLC SDU packet was received by the UE according to received HARQ feedback information for UM mode or until the last part of an RLC SDU packet was received by the UE according to received RLC ACK for AM mode. It is a time interval (0.1 ms). The KPI type is MEAN.

c) Below is the equation for average “Integrated downlink delay in RAN” for this KPI on NetworkSliceSubnet level. The “Integrated downlink delay in RAN” for network slice subnet is the sum of average DL delay in gNB-CU-UP of the network slice subnet (DLDelay\_gNBCUUP\_Nss) and the average DL delay in gNB-DU of the network slice subnet (DLDelay\_gNBDU\_Nss):

DLDelay\_NR\_Nss.*SNSSAI* = DLDelay\_gNBCUUP\_Nss.*SNSSAI* + DLDelay\_gNBDU\_Nss.*SNSSAI* where *SNSSAI* identifies the S-NSSAI that the network slice subnet supports.

d) NetworkSliceSubnet

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| **Next modified section** |

#### 6.3.1.z Downlink delay in gNB-DU

##### 6.3.1.z.1 Downlink delay in gNB-DU for a NRCellDU

a) DLDelay\_gNBDU\_Cell.

b) This KPI describes the average packet transmission delay through the gNB-DU part to the UE. It is used to evaluate delay performance of gNB-DU in downlink. It is the average packets delay time from arrival of an RLC SDU at the RLC ingress F1-U termination until the last part of an RLC SDU packet was received by the UE according to received HARQ feedback information for UM mode or until the last part of an RLC SDU packet was received by the UE according to received RLC ACK for AM mode. It is a Time interval (0.1 ms). The KPI type is MEAN. This KPI can optionally be split into KPIs per QoS level (mapped 5QI or QCI in NR option 3) and per S-NSSAI.

c) Below is the equation for average DL delay in gNB-DU for a NRCellDU:

DLDelay\_gNBDU = DRB.RlcSduDelayDl + DRB.AirIfDelayDl.

and optionally: DLDelay\_gNBDU.*QOS* = DRB.RlcSduDelayDl.*QOS* + DRB.AirIfDelayDl.*QOS* where *QOS* identifies the target quality of service class.

and optionally: DLDelay\_gNB.*SNSSAI* = DRB.RlcSduDelayDl.*SNSSAI* + DRB.AirIfDelayDl.*SNSSAI* where *SNSSAI* identifies the S-NSSAI

d) NRCellDU

##### 6.3.1.z.2 Downlink delay in gNB-DU for a sub-network

a) DLDelay\_gNBDU\_SNw.

b) This KPI describes the average packet transmission delay through the gNB-DU part to the UE. It is used to evaluate delay performance of gNB-DU in downlink for a sub-network. It is the weighted average packets delay time from arrival of an RLC SDU at the RLC ingress F1-U termination until the last part of an RLC SDU packet was received by the UE according to received HARQ feedback information for UM mode or until the last part of an RLC SDU packet was received by the UE according to received RLC ACK for AM mode. It is a Time interval (0.1 ms). The KPI type is MEAN. This KPI can optionally be split into KPIs per QoS level (mapped 5QI or QCI in NR option 3) and per S-NSSAI.

c) Below is the equation for average DL delay in gNB-DU for a sub-network, where

- W is the measurement for the weighted average, one of the following:

- the DL data volume of the NR cell;

- the number of UL user data packets of the NR cell;

- any other types of weight defined by the consumer of KPI

- the #NRCellDU is the number of NRCellDU’s in the SubNetwork.

and optionally KPI on SubNetwork level per QoS and per S-NSSAI:

d) SubNetwork

##### 6.3.1.z.3 Downlink delay in gNB-DU for a network slice subnet

a) DLDelay\_gNBDU\_Nss.

b) This KPI describes the average packet transmission delay through the gNB-DU part to the UE. It is used to evaluate delay performance of gNB-DU in downlink for a network slice subnet. It is the weighted average packets delay time from arrival of an RLC SDU at the RLC ingress F1-U termination until the last part of an RLC SDU packet was received by the UE according to received HARQ feedback information for UM mode or until the last part of an RLC SDU packet was received by the UE according to received RLC ACK for AM mode. It is a Time interval (0.1 ms). The KPI type is MEAN.

c) Below is the equation for average DL delay in gNB-DU for a network slice subnet, where

- W is the measurement for the weighted average, one of the following:

- the DL data volume of the NR cell;

- the number of DL user data packets of the NR cell;

- any other types of weight requested by the consumer of KPI;

- the #NRCellDU is the number of NRCellDU’s associated with the NetworkSliceSubnet.

d) NetworkSliceSubnet

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### 6.3.1.f Downlink delay in gNB-CU-UP

##### 6.3.1.f.1 Downlink delay in gNB-CU-UP

a) DLDelay\_gNBCUUP.

b) This KPI describes the average packet transmission delay through the gNB-CU-UP to the gNB-DU. It is used to evaluate the delay performance of gNB-CU-UP in downlink. It is the average packets delay from reception of IP packet in gNB-CU-UP until the time of arrival, at the gNB-DU, of the RLC SDU at the RLC ingress F1-U termination. It is a Time interval (0.1 ms). The KPI type is MEAN. This KPI can optionally be split into KPIs per QoS level (mapped 5QI or QCI in NR option 3) and per S-NSSAI.

c) Below the equation for average DL delay in a gNB-CU-CP:

DLDelay\_gNBCUUP = DRB. PdcpSduDelayDl + DRB.PdcpF1Delay

and optionally: DLDelay\_ gNBCUUP.*QOS* = DRB.PdcpSduDelayDl.*QOS* + DRB.PdcpF1Delay.*QOS* where *QOS* identifies the target quality of service class.

and optionally: DLDelay\_gNBCUUP.*SNSSAI* = DRB.PdcpSduDelayDl.*SNSSAI* + DRB.PdcpF1Delay.*SNSSAI* where *SNSSAI* identifies the S-NSSAI.

d) GNBCUUPFunction

e) In non-split gNB scenario, the value of DRB.PdcpF1Delay (optionally DRB.PdcpF1Delay.*QOS,* and optionally *DRB.PdcpF*1Delay.*SNSSAI)* is set to zero because there are no F1-interfaces in this scenario.

##### 6.3.1.f.2 Downlink delay in gNB-CU-UP for a sub-network

a) DLDelay\_gNBCUUP\_SNw.

b) This KPI describes the average packet transmission delay through the gNB-CU-UP to the gNB-DU. It is used to evaluate the delay performance of gNB-CU-UP in downlink for a sub-network. It is the weighted average packets delay from reception of IP packet in gNB-CU-UP until the time of arrival, at the gNB-DU, of the RLC SDU at the RLC ingress F1-U termination. It is a Time interval (0.1 ms). The KPI type is MEAN. This KPI can optionally be split into KPIs per QoS level (mapped 5QI or QCI in NR option 3) and per S-NSSAI.

c) Below is the equation for average UL delay in gNB-CU-UP for a sub-network, where

- W is the measurement for the weighted average, one of the following:

- the DL data volume in gNB-CU-UP ;

- the number of DL user data packets in gNB-CU-UP ;

- any other types of weight requested by the consumer of KPI;

- the # GNBCUUPFunctions is the number of GNBCUUPFunctions’s in the SubNetwork.

and optionally KPI on SubNetwork level per QoS and per S-NSSAI:

d) SubNetwork

e) In non-split gNB scenario, the value of DRB.PdcpF1Delay (optionally DRB.PdcpF1Delay.*QOS,* and optionallyDRB.PdcpF1Delay.*SNSSAI)* is set to zero because there are no F1-interfaces in this scenario.

##### 6.3.1.f.3 Downlink delay in gNB-CU-UP for a network slice subnet

a) DLDelay\_gNBCUUP\_Nss.

b) This KPI describes the average packet transmission delay through the gNB-CU-UP to gNB-DU. It is used to evaluate the delay performance of gNB-CU-UP in downlink for a network slice subnet. It is the weighted average packets delay from reception of IP packet in gNB-CU-UP until the time of arrival, at the gNB-DU, of the RLC SDU at the RLC ingress F1-U termination. It is a Time interval (0.1 ms). The KPI type is MEAN.

c) Below is the equation for average UL delay in gNB-CU-UP for a network slice subnet, where

- W is the measurement for the weighted average, one of the following:

- the DL data volume in gNB-CU-UP;

- the number of DL user data packets in gNB-CU-UP;

- any other types of weight requested by the consumer of KPI;

- the # GNBCUUPFunctions is the number of GNBCUUPFunctions’s associated with the NetworkSliceSubnet.

d) NetworkSliceSubnet

e) In non-split gNB scenario, the value of DRB.PdcpF1Delay.*SNSSAI* is set to zero because there are no F1-interfaces in this scenario.

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| **End of modified section** |