**3GPP TSG-SA5 Meeting #129-e *S5-201177rev1***

**Online, , 24th Feb 2020 - 4th Mar 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **28.552** | **CR** | **0186** | **rev** | **-** | **Current version:** | **16.4.0** |  |
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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 | **x** | Core Network |  |

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| ***Title:*** | Rel-16 CR TS 28.552 Add measurement Average delay UL on over-the-air interface | | | | | | | | | |
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| ***Source to WG:*** | Ericsson LM | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_SLICE\_ePA | | | | |  | ***Date:*** | | | 2020-02-13 |
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| ***Category:*** | **B** |  | | | | | ***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 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)* | |
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| ***Reason for change:*** | | Measurement with respect to “Average delay UL on over-the-air interface” is today missing in TS 28.552 measurement specification. The UL delay measurement is needed for evaluation of UL packet delay performance in NG-RAN.  RAN L2 measurements specification TS 38.314 have defined one measurement named “Average over-the-air interface packet delay in the UL per QoS level per UE.” | | | | | | | | |
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| ***Summary of change:*** | | A measurement named “Average delay UL on over-the-air interface“ have been added. The measurement definition from TS 38.314 is re-used.  The UC description in A.4 has been updated with respect to need for UL delay measurements. | | | | | | | | |
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| ***Consequences if not approved:*** | | It will not be possible to monitor the UL packet delay at over-the-air interface. | | | | | | | | |
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| ***Clauses affected:*** | | 2, 5.1.1.1.x(new), A.4 | | | | | | | | |
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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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st modified section** |

# 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] 3GPP TS 32.401: "Telecommunication management; Performance Management (PM); Concept and requirements".

[3] 3GPP TS 32.404: "Performance Management (PM); Performance measurements - Definitions and template".

[4] 3GPP TS 23.501: "System Architecture for the 5G System".

[5] IETF RFC 5136: "Defining Network Capacity".

[6] 3GPP TS 38.473: "NG-RAN; F1 Application Protocol (F1AP)".

[7] 3GPP TS 23.502: "Procedures for the 5G System".

[8] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[9] 3GPP TS 32.425: "Performance Management (PM); Performance measurements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN)".

[10] 3GPP TS 32.451: "Key Performance Indicators (KPI) for Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Requirements".

[11] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[12] Void.

[13] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".[14] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[15] Void.

[16] 3GPP TS 29.244: "Technical Specification Group Core Network and Terminals; Interface between the Control Plane and the User Plane Nodes; Stage 3".

[17] ETSI GS NFV-IFA027 v2.4.1: "Network Functions Virtualisation (NFV); Management and Orchestration; Performance Measurements Specification".

[18] Void.

[19] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[20] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[21] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[22] 3GPP TS 29.413: "Application of the NG Application Protocol (NGAP) to non-3GPP access".

[23] 3GPP TS 29.122: "Technical Specification Group Core Network and Terminals; T8 reference point for Northbound APIs".

[24] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[25] ETSI ES 202 336-12 V1.2.1: "Environmental Engineering (EE); Monitoring and control interface for infrastructure equipment (power, cooling and building environment systems used in telecommunication networks); Part 12: ICT equipment power, energy and environmental parameters monitoring information model".

[26] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[27] 3GPP TS 29.274: "Evolved General Packet Radio Service (GPRS); Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".

[28] 3GPP TS 29.510: "5G System; Network function repository services; Stage 3".

[x] 3GPP TS 38.314: "NR; Layer 2 Measurements”.

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| **Next modified section** |

##### 5.1.1.1.x Average delay UL on over-the-air interface

a) This measurement provides the average (arithmetic mean) over-the-air packet delay on the uplink. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per S-NSSAI.

b) DER (n=1)

c) This measurement is defined in TS 38.314 [x], named “Average over-the-air interface packet delay in the UL per QoS level per UE”. Separate counters are optionally maintained for each mapped 5QI (or QCI for option 3) and for each S-NSSAI. Each measurement is an integer representing the mean delay in milliseconds.

d) The number of measurements is equal to one. If the optional measurements are perfomed, the number of measurements is equal to the number of mapped 5QIs plus the number of S-NSSAIs.

e) The measurement name has the form DRB.AirIfDelayUl, DRB.AirIfDelayUl.*QOS* where *QOS* identifies the target quality of service class, and DRB.AirIfDelayUl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI.

f) NRCellDU.

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

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| **Next modified section** |

# A.4 Monitoring of UL and DL user plane delay in NG-RAN

Satisfying low packet delay is of prime concern for some services, particularly conversational services like speech and instant messaging. As the performance in UL and DL differs, it is important for operators to be able to monitor the UL and DL user plane delay separately. With performance measurements allowing the operator to obtain or derive the UL and DL user plane delay information separately, the operators can pinpoint the services performance problems to specific problems in UL or DL.

The DL delay monitoring in gNB refers to the delay of any packet within NG-RAN, including air interface delay until the UE receives the packet. A gNB deployed in a split architecture, the user plane delay will occur in gNB-CU-UP, on the F1 interface, in gNB-DU and on the air interface. Therefore, the delay measurements related to the four segments needs to be monitored for the DL delay to pinpoint where end user impact from packet delay occurs.

The average DL delay needs to be measured to give an general indication of the delay performance; further more the delay distributions (into bins with delay ranges) need to be measured, to tell the occurrences about the packets with each certain range of delay and better reflect the user experience.

The UL delay monitoring in gNB refers to the delay of any packet within NG-RAN, including air interface delay until the packet leaves gNB-CU-UP. There are 5 components associated to UL delay (PDCP queuing delay in UE, UL over-the-air interface delay, gNB-DU delay, F1-U delay, CU-UP delay). Therefore, the delay measurements related to these five segments needs to be monitored for the UL delay to pinpoint where end user impact from packet delay occurs. The beamforming capabilities of the NRCellDU and of the UE can be different. This might create a difference in the successful reception probability of the DL data transmitted by the gNB-DU, versus the UL data transmitted by the UE as the later might involve more retransmission than the former one. This will increase the UL over-the-air delay compared to the DL over-the-air delay.

Different network slices may have different requirements on the delay, so the delay needs to be measured for each S-NSSAI.

To further pinpoint a detected delay performance problem, the packet delay measurement separation may be based on mapped 5QI (or for QCI in case of NR option 3).

NOTE: It is an asumtion that the DL/UL delay on the F1 interface is equal, only DL measurement is defined. It is also assumed that the UL delay in the gNB-DU and in the gNB-CU-UP is small (compared to over-the-air delay) and not considered.

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| **End of modified section** |