**3GPP TSG-SA5 Meeting #129e *S5-201179rev2***

**e-meeting, 24 February – 4 March 2020**

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **28.552** | **CR** | **0188** | **rev** | **1** | **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 |  |

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| ***Title:*** | Add measurements related to DL delay between PSA UPF and NG-RAN | | | | | | | | | |
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| ***Source to WG:*** | Intel | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_SLICE\_ePA | | | | |  | ***Date:*** | | | 2020-02-08 |
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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:*** | | The DL packet delay has direct impact to users’ experience for some types of services (e.g., URLLC). The DL delay between PSA UPF and NG-RAN is part of the end to end one-way delay and is not expected very long comparing to the delay in between NG-RAN and UE.  In case the PSA UPF and NG-RAN are time synchronised, the DL one way delay can be measured by NG-RAN.  The measurements on the DL delay between PSA UPF and NG-RAN can be used to evaluate and optimize the DL user plane delay performance between 5GC and NG-RAN. | | | | | | | | |
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| ***Summary of change:*** | | Added measurements on DL one way packet delay between PSA UPF and NG-RAN. | | | | | | | | |
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| ***Consequences if not approved:*** | | The DL delay between PSA UPF and NG-RAN cannot be monitored. | | | | | | | | |
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| ***Clauses affected:*** | | 2, 5.1.1.x (new), A.x (new) | | | | | | | | |
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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:*** | |  | | | | | | | | |

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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 38.415: "NG-RAN; PDU session user plane protocol".

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| **Next Modified Sections** |

#### 5.1.1.x DL packet delay between NG-RAN and PSA UPF

##### 5.1.1.x.1 Average DL GTP packet delay between PSA UPF and NG-RAN

a) This measurement provides the average DL GTP packet delay between PSA UPF and NG-RAN. This measurement is split into subcounters per 5QI and subcounters per S-NSSAI. This measurement is only applicable to the case the PSA UPF and NG-RAN are time synchronised.

b) DER (n=1).

c) The measurement is obtained by the following method:

The UPF samples the GTP packets for QoS monitoring based on the policy provided by OAM or SMF.

NOTE: The sampling rate may vary for different S-NSSAI and different 5QIs, and the specific sampling rate is up to implementation unless given by the QoS monitoring policy.

For each DL GTP PDU (packet i) encapsulated with QFI, TEID, and QMP indicator for QoS monitoring, the gNB records the following time stamps and information (see 23.501 [4] and 38.415 [x]):

- T1 received in the GTP-U header indicating the local time that the DL GTP PDU was sent by the PSA UPF;

- T2 that the DL GTP PDU was received by NG-RAN;

- The 5QI and S-NSSAI associated to the DL GTP PDU.

The gNB counts the number (N) of DL GTP PDUs encapsulated with QFI, TEID, and QMP indicator for each 5QI and each S-NSSAI respectively, and takes the following calculation for each 5QI and each S-NSSAI:

d) Each measurement is a real representing the average delay in microseconds.

e) GTP.DelayDlPsaUpfNgranMean.*5QI, where 5QI* identifies the 5QI;   
GTP.DelayDlPsaUpfNgranMean.*SNSSAI, where SNSSAI* identifies the S-NSSAI.

f) EP\_N3 (contained by GNBCUUPFunction).

g) Valid for packet switched traffic.

h) 5GS.

##### 5.1.1.x.2 Distribution of DL GTP packet delay between PSA UPF and NG-RAN

a) This measurement provides the distribution of DL GTP packet delay between PSA UPF and NG-RAN. This measurement is split into subcounters per 5QI and subcounters per S-NSSAI. This measurement is only applicable to the case the PSA UPF and NG-RAN are time synchronised.

b) DER (n=1).

c) The measurement is obtained by the following method:

The UPF samples the GTP packets for QoS monitoring based on the policy provided by OAM or SMF.

NOTE: The sampling rate may vary for different S-NSSAI and different 5QIs, and the specific sampling rate is up to implementation unless given by the QoS monitoring policy.

For each DL GTP PDU (packet i) encapsulated with QFI, TEID, and QMP indicator for QoS monitoring, the gNB records the following time stamps and information (see 23.501 [4] and 38.415 [x]):

- T1 received in the GTP-U header indicating the local time that the DL GTP PDU was sent by the PSA UPF;

- T2 that the DL GTP PDU was received by NG-RAN;

- The 5QI and S-NSSAI associated to the DL GTP PDU.

The gNB 1) takes the following calculation for each DL GTP PDU (packet i) encapsulated with QFI, TEID, and QMP indicator for each 5QI and each S-NSSAI respectively, and 2) increment the corresponding bin with the delay range where the result of 1) falls into by 1 for the subcounters per 5QI and subcounters per S-NSSAI.

d) Each measurement is an integer representing the number of GTP PDUs measured with the delay within the range of the bin.

e) GTP.DelayDlPsaUpfNgranDist.*5QI*.*Bin,* Where *Bin* indicates a delay range which is vendor specific, and *5QI* identifies the 5QI;   
GTP.DelayDlPsaUpfNgranDist.*SNSSAI.bin,* Where *Bin* indicates a delay range which is vendor specific, and *SNSSAI* identifies the S-NSSAI.

f) EP\_N3 (contained by GNBCUUPFunction).

g) Valid for packet switched traffic.

h) 5GS.

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| **Next Modified Sections** |

# A.x Monitoring of one way delay between PSA UPF and NG-RAN

The DL and UL one way delay has direct impact to users’ experience for some types of services (e.g., URLLC). The one way delay between PSA UPF and NG-RAN is part of the end to end one-way delay and is not expected very long comparing to the delay in between NG-RAN and UE.

In case the PSA UPF and NG-RAN are time synchronised, the UL one way delay can be measured by PSA UPF and the DL one way delay can be measured by NG-RAN.

The measurements on the one way DL and UL delay between PSA UPF and NG-RAN can be used to evaluate and optimize the DL and UL user plane delay performance between 5GC and NG-RAN.

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| **End of Modified Sections** |