**3GPP TSG-SA5 Meeting #131e *S5-203089***

**e-meeting 25th May-3rd June 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | 28.552 | **CR** | 0237 | **rev** | - | **Current version:** | 16.5.0 |  |
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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:***  | Add Paging measurement |
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| ***Source to WG:*** |  ZTE, China Mobile |
| ***Source to TSG:*** | S5 |
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| ***Work item code:*** | 5G\_SLICE\_ePA |  | ***Date:*** | 2020/5/13 |
|  |  |  |  |  |
| ***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 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:*** | The paging load per cell is an important measure for the operator as it allows the operator to properly dimension the resources for paging in the NR  Cell. |
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| ***Summary of change:*** | Add paging measurement. |
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| ***Consequences if not approved:*** | The paging measurement is missing. |
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| ***Clauses affected:*** | 5.1.1.X(new), 5.1.1.X.1(new), 5.1.1.X.2(new), 5.1.1.X.3(new), 5.1.1.X.4(new), 5.1.1.X.5(new), A.X(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 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".

[29] 3GPP TS 38.314: "NR; layer 2 measurements".

[30] 3GPP TS 38.313: "Self-Organizing Networks (SON) for 5G networks".

[31] 3GPP TS 38.415: "NG-RAN; PDU session user plane protocol".

[32] 3GPP TS 38.321: "NR MAC protocol specification".

[33] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[34] 3GPP TS 38.215: "NR; Physical layer measurements".

[x] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state".

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| **Next modified section** |

#### 5.1.1.X Paging Measurement

5.1.1.x.1 Number of CN Initiated paging records received by the NRCELLCU

a) This measurement provides number of CN Initiated paging records received by the gNB-CU for paging occasions in each cell.

b) CC.

c) Reception of a PAGING message from AMF, (See in TS 38.413 [11]) .

d) A single integer value.

e) PAG.ReceivedNbrCnInitiated.

f) GNBCUCPFunction

g) Valid for packet switched traffic

h) 5GS

5.1.1.x.2 Number of NR RAN Initiated paging records received by the NRCELLCU

a) This measurement provides number of NR RAN Initiated paging records received by the gNB-CU for paging occasions in each cell.

b) CC.

c) Reception of a PAGING message from NR RAN (See inTS 38.304[X]) .

d) A single integer value.

e) PAG.ReceivedNbrRanIntiated.

f) GNBCUCPFunction

g) Valid for packet switched traffic

h) 5GS

5.1.1.x.3 Number of paging records received by the NRCELLDU

a) This measurement provides number of paging records received by gNB-DU which shall perform paging of the UE in cells which belong to cells as indicated in the *Paging Cell List* IE (See in TS 38.473 [6]).

b) CC.

c) Reception of a PAGING message from gNB-CU , (See in TS 38.473 [6]) .

d) A single integer value.

e) PAG.ReceivedNbr.

f) NRCELLDU

g) Valid for packet switched traffic

h) 5GS

5.1.1.x.4 Number of congested Paging records

a) This measurement provides number of congested paging records which missing paging occasion in NRCELLDU.

b) CC.

c) Reception of a F1AP PAGING message from gNB-CU (See in TS 38.473 [6]), with UE\_ID which satisfies the PF and PO for paging from TS 38.304[X] ,the PF and PO for paging are determined by the following formula:

SFN for the PF is determined by:

(SFN + PF\_offset) mod T = (T div N)\*(UE\_ID mod N)

Index (i\_s), indicating the index of the PO is determined by:

i\_s = floor (UE\_ID/N) mod Ns

AND exceeds the maximum number of paging records that can be sent for one paging occasion .

d) A single integer value.

e) PAG.CongestedNbr.

f) NRCELLDU

g) Valid for packet switched traffic

h) 5GS

5.1.1.x.5 Number of CN Initiated records by discarded NRCELLDU

a) This measurement provides number of CN Initiated paging records which discarded by NRCELLDU.

b) CC.

c) Reception of a F1AP PAGING message from gNB-CU (See in TS 38.473 [6]), with UE\_ID which satisfies the PF and PO for paging from TS 38.304[X] ,the PF and PO for paging are determined by the following formula:

SFN for the PF is determined by:

(SFN + PF\_offset) mod T = (T div N)\*(UE\_ID mod N)

Index (i\_s), indicating the index of the PO is determined by:

i\_s = floor (UE\_ID/N) mod Ns

AND the maximum number of paging records that can be queued for each paging occasion has been reached.

d) A single integer value.

e) PAG.CongestedNbr.

f) NRCELLDU

g) Valid for packet switched traffic

h) 5GS

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| **Next modified section** |

# A.x Monitor of paging performance

In NR, Paging is under the control of the 5GC or NR RAN(aka RAN initiated paging and CN initiated paging). When the 5GC wants to page (CN initiated paging) a UE, it has to page it in all cells that belong to the TA(s) to which the UE is registered.

The paging load per cell is an important measure for the operator as it allows the operator to properly dimension the resources for paging in the NR Cell.

At an NR Cell it makes sense to measure the number of discarded paging messages if this is due to some problem in the GNodeB, such as paging occasion overflow. In that scenario the periodicity of paging occasions can be reconfigured in order to ensure that all paging messages are transmitted by the GNodeB in the first available paging occasion, thereby avoiding paging delays and extended call setup delay. The congested paging measurement can be useful for the case.

Operators need to know when such an event occurs, in order to identify if the problem is at the NR cell level or not.

In addition to discarded paging records measurement, it is important to know total paging records received so that discarded paging records ratio can be derived.

Total number of paging records received is important in the sense that, it may be fine if the discarded paging records are high if discarded paging records ratio is small. On the other hand, it may be problematic if discarded paging records are low, if discarded paging records ratio turn out to be high.

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| **End of modifications** |