**3GPP TSG-RAN WG3 Meeting #116-e *R3-223950***

**E-meeting, 09 May – 19 May 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.300** | **CR** |  | **rev** | **1** | **Current version:** | **17.0.0** |  |
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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 | **X** |

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| ***Title:*** | Correction of the "last used cell" in UE Context Release Complete | | | | | | | | | |
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| ***Source to WG:*** | Huawei, Nokia, Nokia Shanghai Bell, Ericsson, ZTE, CATT, Samsung, Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | R3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_UE\_pow\_sav\_enh | | | | |  | ***Date:*** | | | 2022-05-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In TS 38.331 v17.0.0, the *lastUsedCellOnly-r17* is included in SIB1 for UE power saving for paging monitoring. Its descriptions are given as follows.   * *lastUsedCellOnly*   + *When present, the field indicates that the UE monitors PEI only if its last connection was released by this cell. A PEI-capable UE stores its last used cell information.*   Also as indicated in TS 38.300 v17.0.0, the UE will store the last used cell information.  In oder to support the “last used cell” feature, in the NGAP UE context release complete, the gNB needs to send the last used cell information to the AMF, then the AMF can send it back in case of the CN initiated Paging. This is arleady supported in the current TS 38.413 (which was also discussed during R16 eMTC/NB-IoT enhancements WI).  But the TS 38.300 needs to give clear instructions. Note that in TS 36.300 for (G)WUS, this is also covered as follows.  - *To reduce WUS use in cells not monitored by the UE, WUS-capable (ng-)eNBs provide UE's last used cell information to MME/AMF in the S1-AP/NG-AP UE Context Release Complete or UE Context Suspend Request messages for all UEs, as described in TS 23.401 [17] and TS 23.501 [82]. In case of immediate suspension of a UE, the WUS-capable ng-eNB also provides the UE's last cell information to the AMF in the UE Context Resume Request message, as described in TS 23.501 [82].*  Similarly, for NR PEI, the similar descriptions can be captured in the stage2 specification. | | | | | | | | |
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| ***Summary of change:*** | | Add the texts that the PEI capable gNBs will provide the UE’s last used cell information in UE context release complete message  Impact Analysis:  Impact assessment towards the previous version of the specification (same release):  This CR has isolated impact with the previous version of the specification (same release).  The impact can be considered isolated because the change only affects the UE power saving function. | | | | | | | | |
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| ***Consequences if not approved:*** | | Not clear how the gNB/AMF supports the UE power saving “last used cell” feature. | | | | | | | | |
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| ***Clauses affected:*** | | 9.2.5 | | | | | | | | |
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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:*** | | Rev0: R3-223242  Rev1: R3-223950  Update the procedure texts based on online comments. | | | | | | | | |

*CHANGE BEGINS*

### 9.2.5 Paging

Paging allows the network to reach UEs in RRC\_IDLE and in RRC\_INACTIVE state through *Paging* messages, and to notify UEs in RRC\_IDLE, RRC\_INACTIVE and RRC\_CONNECTED state of system information change (see clause 7.3.3) and ETWS/CMAS indications (see clause 16.4) through *Short Messages*. Both *Paging* messages and *Short Messages* are addressed with P-RNTI on PDCCH, but while the former is sent on PCCH, the latter is sent over PDCCH directly (see clause 6.5 of TS 38.331 [12]).

**<Unchanged Text Omitted>**

**UE power saving for paging monitoring:** in order to reduce UE power consumption due to false paging alarms, the group of UEs monitoring the same PO can be further divided into multiple subgroups. With subgrouping, a UE shall monitor PDCCH in its PO for paging if the subgroup to which the UE belongs is paged as indicated via associated PEI. If a UE cannot find its subgroup ID with the PEI configurations in a cell or if the UE is unable to monitor the associated PEI occasion corresponding to its PO, it shall monitor the paging in its PO.

These subgroups have the following characteristics:

- They are formed based on either CN controlled subgrouping or UE ID based subgrouping;

- If specific subgrouping information is not provided from CN, UE ID based subgrouping is used if supported by the UE and network;

- The RRC state (RRC\_IDLE or RRC\_INACTIVE state) does not impact UE subgroup of a UE;

- Subgrouping support for RAN is broadcast in the system information as one of the following: Only CN controlled subgrouping supported, Only UE ID based subgrouping supported, or both CN controlled subgrouping and UE ID based subgrouping supported;

- Total number of subgroupings allowed in a cell is limited to 8 and represents the sum of CN-assigned and UEID-based subgrouping configured by the network;

- A UE with CN-assigned subgroup ID shall derive UEID-based subgroup ID in a cell supporting only UEID-based subgrouping.

PEI associated with subgroups has the following characteristics:

- If the PEI is supported by the UE, it shall at least support UEID-based subgrouping method;

- PEI monitoring can be limited via system information to the cell in which its last connection was released;

- A PEI-capable UE shall store its last used cell information;

- gNBs supporting the PEI monitoring to the last used cell function provide the UE's last used cell information to the AMF in the NG-AP UE Context Release Complete message for PEI capable UEs, as described in TS 38.413 [26];

- UE that expects MBS group notification shall ignore the PEI and shall monitor paging in its PO.

**CN controlled subgrouping:** AMF is responsible for assigning subgroup ID to the UE. The total number of subgroups for CN controlled subgrouping can be configured up to 8, e.g. by OAM. The following figure describes the procedure for CN controlled subgrouping:



Figure 9.2.5-1: Procedure for CN controlled subgrouping

1. The UE indicates its support of CN controlled subgrouping via NAS signalling.

2. If the UE supports CN controlled subgrouping, the AMF determines the subgroup ID assignment for the UE.

3. The AMF sends subgroup ID to the UE via NAS signalling.

4. The AMF informs the gNB about the assigned subgroup ID for paging the UE in RRC\_IDLE/ RRC\_INACTIVE state.

5. When the paging message for the UE is received from the CN or is generated by the gNB, the gNB determines the PO and the associated PEI occasion for the UE.

6. Before the UE is paged in the PO, the gNB transmits the associated PEI and indicates the subgroup(s) of the UE(s) that is paged in the PEI if supported by the UE(s).

**UE ID based subgrouping:** gNB and UE can determine the subgroup ID based on the UE ID and the total number of subgroups for UE ID based subgrouping in the cell. The total number of subgroups for UE ID based subgrouping is decided by the gNB for each cell and can be different in different cells. The following figure describes the procedure for UE ID based subgrouping:



Figure 9.2.5-2: Procedure for UE ID based subgrouping

1. The gNB determines the total number of subgroups for UE ID based subgrouping in a cell.

2. The gNB broadcasts the total number of subgroups for UE ID based subgrouping in a cell.

3. When paging message for the UE is received from the CN to the gNB or is generated by the gNB, the gNB determines the PO and the associated PEI occasion for the UE.

4. Before the UE is paged in the PO, the gNB transmits the associated PEI and indicates the subgroup(s) of the UE(s) that is paged in the PEI if supported by the UE(s).

**<Unchanged Text Omitted>**

*CHANGE ENDS*