**3GPP TSG-RAN WG3 Meeting #108-eR3-204173**

**1- 10 June 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.300** | **CR** | draft | **rev** | **-** | **Current version:** | **15.9.0** |  |
|  | | | | | | | | |
| *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 |  | Core Network |  |

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| ***Title:*** | draft CR 36.300 for WUS awareness | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | RAN3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NB\_IOTenh3-Core, LTE\_eMTC5-Core | | | | |  | ***Date:*** | | | 21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *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:*** | | To capture the WUS awareness procedure. | | | | | | | | |
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| ***Summary of change:*** | | According to the SA2 LS(R3-203117), RAN3 has agreed that, in order to reduce WUS use in cells not monitored by the UE, WUS-capable eNBs provide UE’s last cell information to MME in the S1 UE Context Release Complete or UE Context Suspend Request messages for all UEs, as described in TS 23.401.  **Impact analysis**  Impacted functionality:  Paging with Wake Up Signal  Inter-operability:  If the UE is implemented according to this CR and the network is not, there is no inter-operability issue.  If the network is implemented according to the CR and the UE is not, the UE may misinterpret the non-indication of WUS and miss the paging.  Backward compatibiliy:  The CR is not backward compatible to previous version of the specification. | | | | | | | | |
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| ***Consequences if not approved:*** | | WUS may increase rather than decrease UE power consumption | | | | | | | | |
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| ***Clauses affected:*** | | 10.1.4 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **Y** |  | Other core specifications | | | | TS 23.401 CR 3600  TS 36.304 CR xxxx  TS 36.413 CR xxxx | | |
| ***affected:*** | |  | **N** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **N** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R3-203184 | | | | | | | | |

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10.1.4 Paging and C-plane establishment

Paging groups (where multiple UEs can be addressed) are used on PDCCH:

- Precise UE identity is found on PCH;

- DRX configurable via BCCH and NAS, for NB-IoT DRX configurable via BCCH only;

- Only one subframe allocated per paging interval per UE;

- The network may divide UEs to different paging occasions in time;

- There is no grouping within paging occasion;

- One paging RNTI for PCH.

When extended DRX (eDRX) is used in idle mode, the following are applicable:

- The DRX cycle is extended up to and beyond 10.24s in idle mode, with a maximum value of 2621.44 seconds (43.69 minutes); For NB-IoT, the maximum value of the DRX cycle is 10485.76 seconds (2.91 hours);

- The hyper SFN (H-SFN) is broadcast by the cell and increments by one when the SFN wraps around;

- Paging Hyperframe (PH) refers to the H-SFN in which the UE starts monitoring paging DRX during a Paging Time Window (PTW) used in ECM-IDLE. The PH is determined based on a formula that is known by the MME, UE and eNB as a function of eDRX cycle and UE identity;

- During the PTW, the UE monitors paging for the duration of the PTW (as configured by NAS) or until a paging message is including the UE's NAS identity received for the UE, whichever is earlier. The possible starting offsets for the PTW are uniformly distributed within the PH and defined in TS 36.304 [11];

- MME uses the formulas defined in TS 36.304 [11] to determine the PH as well as the beginning of the PTW and sends the S1 paging request just before the occurrence of the start of PTW or during PTW to avoid storing paging messages in the eNB;

- ETWS, CMAS, PWS requirement may not be met when a UE is in eDRX. For EAB, if the UE supports SIB14, when in extended DRX, it acquires SIB14 before establishing the RRC connection;

- When the eDRX cycle is longer than the system information modification period, the UE verifies that stored system information remains valid before establishing an RRC connection. Paging message can be used for system information change notification, when including *systemInfoModification-eDRX*, for a UE configured with eDRX cycle longer than the system information modification period.

NB-IoT UEs, BL UEs or UEs in enhanced coverage can use WUS, when configured in the cell, to reduce the power consumption related to paging monitoring.

When WUS is used in idle mode, the following are applicable:

- The WUS is used to indicate that the UE shall monitor MPDCCH or NPDCCH to receive paging in that cell;

- For a UE not configured with extended DRX, the WUS is associated to one paging occasion (N = 1);

- For a UE configured with extended DRX, the WUS can be associated to one or multiple paging occasion(s) (N ≥ 1) in a PTW;

- If UE detects the WUS, the UE shall monitor the following N paging occasions unless it has received a paging message;

- The paging operation in the MME is not aware of the use of the WUS in the eNB.

- To reduce WUS use in cells not monitored by the UE, WUS-capable eNBs provide UE’s last cell information to MME in the S1 UE Context Release Complete or UE Context Suspend Request messages for all UEs, as described in TS 23.401 [xx].

The timing between WUS and the paging occasion (PO) is illustrated in Figure 10.1.4-1. The UE can expect WUS repetitions during "Configured maximum WUS duration" but the actual WUS transmission can be shorter, e.g. for UE in good coverage. The UE does not monitor WUS during the non-zero "Gap".

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**Figure 10.1.4-1: Illustration of WUS timing**

For NB-IoT, UE in RRC\_IDLE receives paging on the anchor carrier or on a non anchor carrier based on system information.

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