**3GPP TSG-RAN WG2 Meeting #113-e *R2-20xxxxx***

**E-meeting, 25th Jan – 5th Feb 2021**

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| *CR-Form-v11.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **36.331** | **CR** | **xx** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *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 | **x** | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | RRC CR on LTE RRC processing time with segmentation | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core,TEI16 | | | | |  | | ***Date:*** | | 2021-01-14 |
|  |  | | | |  | | |  | |  |
| ***Category:*** | **F** |  | | | | | | ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The legacy NR RRC processing delay requirement is defined based on the assumption that UE operates on a maximum size of 8188 bytes for RRC processing in DL (incl. ASN.1 decoding, configuration validation, and applying the configuration in lower layers).  In R16, DL segmentation transmission is introduced in R16, the max RRC message size is up to 45 KB. The additional load of pre and post-processing RRC segments is introduced in UE side in case all the segments are provided by the network in one TTI, and this adds additional processing delay that is not accounted for in the current specification. | | | | | | | | |
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| ***Summary of change:*** | | Define the LTE RRC processing time requirement for DL RRC message with segmentation as below:   * 20ms + (Nseg-1)\* [2ms] * Nseg is number of RRC segments * 20ms includes the processing time of UE functionalities which is needed only once for all received segments and no impact by the message size. * X is the additional processing time per segment, e.g. DL processing, extra processing time for ASN.1 decoding, configuration application. * X time in milli-seconds required to process an RRC segment.   **Impact analysis**  Impacted 5G architecture options:  LTE SA, (NG)EN-DC  Impacted functionality:  RRC processing time requirement  Inter-operability:   * If the UE is implemented according to the CR and the network is not, UE cannot provide the RRC Reconfiguration/Resume Complete message if NW provide the UL grant earlier than the newly defined timing. * If the network is implemented according to the CR and the UE is not, there is no inter-operability issue. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | If NW provide RRC Reconfiguration/Resume message with segmenration, UE cannot finish the internal implementation and provide the RRC Complete message  according to the legacy timing. | | | | | | | | |
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| ***Clauses affected:*** | | 11.2 | | | | | | | | |
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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 | | | CR | | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Start of changes

11.2 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following tables, by means of a value N:

N = the number of 1ms subframes from the end of reception of the E-UTRAN -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> E-UTRAN response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation).

NOTE: No processing delay requirements are specified for RN-specific procedures.

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**Figure 11.2-1: Illustration of RRC procedure delay**

**Table 11.2-1: UE performance requirements for RRC procedures for UEs other than NB-IoT UEs**

| **Procedure title:** | **E-UTRAN -> UE** | **UE -> E-UTRAN** | **N** | **Notes** |
| --- | --- | --- | --- | --- |
| **RRC Connection Control Procedures** | | | | |
| RRC connection establishment | *RRCConnectionSetup or RRCConnectionResume* | *RRCConnectionSetupComplete or RRCConnectionResumeComplete* | 15 or 3 | N = 3 applies for the case of reception of *RRCConnectionResume* if *reducedCP-LatencyEnabled* is configured, the UE supports reduced CP latency, and the RRC message only includes MAC and PHY (re-)configurations and does not include (re-)configurations of DRX, SPS, SCells, and MIMO. Further, the UL grant is sent using PDCCH DCI format 0 in common search space. In this scenario, the RRC procedure delay can extend beyond the reception of the UL grant, up to 7 ms.  For other cases N = 15 applies. |
| RRC connection release | *RRCConnectionRelease* |  | NA |  |
| RRC connection re-configuration (radio resource configuration, possibly including configuration of conditional reconfigurations) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 | Same requirement is applicable regardless of the number of target candidates being configured, if conditional reconfigurations are included in the message, |
| RRC connection re-configuration (measurement configuration) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 |  |
| RRC connection re-configuration (intra-LTE mobility) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 |  |
| RRC connection reconfiguration (SCell addition/release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 |  |
| RRC connection reconfiguration (SCG establishment/ release, SCG cell addition/ release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 |  |
| RRC connection re-configuration (NR measurement configuration) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 |  |
| RRC connection reconfiguration (NR SCG establishment/ /modification/release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 |  |
| RRC connection re-configuration (intra-LTE mobility with NR SCG establishment/ /modification/release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 |  |
| RRC connection re-configuration | *DLDedicatedMessageSegment* | *RRCConnectionReconfigurationComplete* | 20+(N-1)\*[2] | N is number of RRC segments |
| RRC connection re-establishment | *RRCConnectionReestablishment* | *RRCConnectionReestablishmentComplete* | 15 |  |
| Initial security activation | *SecurityModeCommand* | *SecurityModeCommandComplete/SecurityModeCommandFailure* | 10 |  |
| Initial security activation + RRC connection re-configuration (RB establishment) | *SecurityModeCommand, RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 | The two DL messages are transmitted in the same TTI |
| EDT or transmission using PUR | *RRCEarlyDataComplete* or *RRCConnectionRelease* |  | NA |  |
| Paging | *Paging* |  | NA |  |
| RRC connection resume (SCG establishment/ restoration/release) | *RRCConnectionResume* | *RRCConnectionResumeComplete* | 20 |  |
| RRC connection resume (MCG SCell addition/restoration/release) | *RRCConnectionResume* | *RRCConnectionResumeComplete* | 20 |  |
| RRC connection resume | *DLDedicatedMessageSegment* | *RRCConnectionResumeComplete* | 20+(N-1)\*[2] | N is number of RRC segments |
| **Inter RAT mobility** | | | | |
| Handover to E-UTRA | *RRCConnectionReconfiguration (sent by other RAT)* | *RRCConnectionReconfigurationComplete* | NA | The performance of this procedure is specified in TS 45.010 [50] in case of handover from GSM and TS 25.133 [29], TS 25.123 [30] in case of handover from UTRA. |
| Handover from E-UTRA | *MobilityFromEUTRACommand* |  | NA | The performance of this procedure is specified in TS 36.133 [16] |
| Handover from E-UTRA to CDMA2000 | *HandoverFromEUTRAPreparationRequest (CDMA2000)* |  | NA | Used to trigger the handover preparation procedure with a CDMA2000 RAT.  The performance of this procedure is specified in TS 36.133 [16] |
| **Measurement procedures** | | | | |
| Measurement Reporting |  | *MeasurementReport* | NA |  |
| **Other procedures** | | | | |
| UE capability transfer | *UECapabilityEnquiry* | *UECapabilityInformation* | 10/ 80 | N = 80 applies in case the UE has to report at least one of the following UE capabilities.  - MR-DC band combinations.  - NR band combinations  - EUTRA feature sets |
| Counter check | *CounterCheck* | *CounterCheckResponse* | 10 |  |
| Proximity indication |  | *ProximityIndication* | NA |  |
| UE information | *UEInformationRequest* | *UEInformationResponse* | 15 |  |
| MBMS counting | *MBMSCountingRequest* | *MBMSCountingResponse* | NA |  |
| MBMS interest indication |  | *MBMSInterestIndication* | NA |  |
| In-device coexistence indication |  | *InDeviceCoexIndication* | NA |  |
| UE assistance information |  | *UEAssistanceInformation* | NA |  |
| SCG failure information |  | *SCGFailureInformation* | NA |  |
| NR SCG failure information |  | *SCGFailureInformationNR* | NA |  |
| Sidelink UE information |  | *SidelinkUEInformation* | NA |  |
| WLAN Connection Status Reporting |  | *WLANConnectionStatusReport* | NA |  |
| PUR Configuration Request |  | *PURConfigurationRequest* | NA |  |

End of changes