**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** |
|  |
|  | **38.331** | **CR** | **xx** | **rev** | **-** | **Current version:** | **16.3.1** |  |
|  |
| *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 NR RRC processing time with segmentation |
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| ***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 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 legacy NR RRC processing delay requirement is defined based on the assumption that UE operates on a maximum size of 9000 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 NR RRC processing time requirement for DL RRC message with segmentation as below: * 16ms + (Nseg-1)\*X
* Nseg is number of RRC segments
* 16ms 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.
* X = [2ms]

**Impact analysis**Impacted 5G architecture options: NR SA, NE-DC, NR-DCImpacted functionality: RRC processing time requirementInter-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.
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| ***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:*** | 12 |
|  |  |
|  | **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

12 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following tables. The performance requirement is expressed as the time in [ms] from the end of reception of the network -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> network 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). In case the RRC procedure triggers BWP switching, the RRC procedure delay is the value defined in the following table plus the BWP switching delay defined in TS 38.133 [14], clause 8.6.3.

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**Figure 12.1-1: Illustration of RRC procedure delay**

**Table 12.1-1: UE performance requirements for RRC procedures for UEs**

| **Procedure title:** | **Network -> UE** | **UE -> Network** | **Value [ms]** | **Notes** |
| --- | --- | --- | --- | --- |
| **RRC Connection Control Procedures** |
| RRC reconfiguration | *RRCReconfiguration* | *RRCReconfigurationComplete* | 10 |  |
| RRC reconfiguration (scell addition/release) | *RRCReconfiguration* | *RRCReconfigurationComplete* | 16 |  |
| RRC reconfiguration (SCG establishment/ modification/ release) | *RRCReconfiguration* | *RRCReconfigurationComplete* | 16 |  |
| RRC reconfiguration  | *DLDedicatedMessageSegment* | *RRCReconfigurationComplete* | 16+(N-1)\*[2] | N is number of RRC segments |
| RRC setup | *RRCSetup* | *RRCSetupComplete* | 10 |  |
| RRC Release | *RRCRelease* |  | NA |  |
| RRC re-establishment | *RRCReestablishment* | *RRCReestablishmentComplete* | 10 |  |
| RRC resume | *RRCResume* | *RRCResumeComplete* | 6 or 10 | Value=6 applies for a UE supporting reduced CP latency for the case of RRCResume message only including MAC and PHY configuration, and no DRX, SPS, configured grant, CA or MIMO re-configuration will be triggered by this message. Further, the UL grant for transmission of *RRCResumeComplete* and the data is transmitted over common search space with DCI format 0\_0.In this scenario, the RRC procedure delay [ms] can extend beyond the reception of the UL grant, up to 7 ms.For other cases, Value = 10 applies. |
| RRC resume (MCG SCell addition/restoration/release) | *RRCResume* | *RRCResumeComplete* | 16 |  |
| RRC resume (SCG establishment/ restoration/release) | *RRCResume* | *RRCResumeComplete* | 16 |  |
| RRC resume | *DLDedicatedMessageSegment* | *RRCResumeComplete* | 16+(N-1)\*[2] | N is number of RRC segments |
| Initial AS security activation | *SecurityModeCommand* | *SecurityModeComplete/SecurityModeFailure* | 5 |  |
| Other procedures |
| UE assistance information |  | *UEAssistanceInformation* | NA |  |
| UE capability transfer | *UECapabilityEnquiry* | *UECapabilityInformation* | 80 |  |
| Counter check | *CounterCheck* | *CounterCheckResponse* | 5 |  |
| UE information | *UEInformationRequest* | *UEInformationResponse* | 15 |  |
| DL Information transfer MR-DC | *DLInformationTransferMRDC* |  | NA | The UE shall apply the performance requirements of the RRC message included within the DLInformationTransferMRDC message. |
| IAB other information |  | *IABOtherInformation* | NA |  |
| Sidelink UE information |  | *SidelinkUEInformationNR* | NA |  |

End of changes