**3GPP TSG-RAN** **WG2 Meeting #110-e R2-200xxxx**

**Electronic, June 1 – 12, 2020**

**Source: Qualcomm Incorporated**

**Title: Summary of email discussion [AT110e][017A][NR15] UE cap Number of bearers**

**Document for: Decision**

**Agenda Item: 5.4.3.1**

# Introduction

This document summarizes the following email discussion.

* [AT110e][017A][NR15] UE cap Number of bearers (Qualcomm)

Scope: Treat [R2-2004441](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004441.zip), [R2-2005358](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005358.zip), [R2-2005359](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005359.zip), [R2-2004432](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004432.zip), [R2-2004433](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004433.zip), [R2-2005004](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005004.zip), [R2-2005005](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005005.zip), [R2-2005007](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005007.zip) (proponents are responsible to explain and drive)

Part 1: Decision whether to make corrections or not, identify agreeable corrections. Deadline: June 4, 0700 UTC.

Part 2: For agreeable parts, continuation to agree CRs. Deadline: June 10, 0700 UTC

# Discussion: Part 1 (by June 4, 0700 UTC)

The following topics are discussed in this email discussion.

* Clarifying a note in section 8 of TS38.306
* Clarifying the number of RLC bearers a UE shall support.
* Need of inter-node coordination when the minimum UE requirement for the number of RLC bearers is clarified.

## Note for #DRBs in section 8 of TS38.306

Contributions (e.g. [R2-2004432](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004432.zip)) proposes to clarify the following note.

| Parameter | Description | Value |
| --- | --- | --- |
| #DRBs | The number of DRBs that a UE shall support. | 16 per UE.  NOTE: 8 per MAC entity with duplication. |

It is rapporteur’s understanding that there is good consensus from RAN2#109bis-e meeting that the note was intended to indicate the limitation that the Duplication Activation/Deactivation MAC-CE has a single octet field to point to duplication DRBs associated with a MAC entity.

Companies are requested to comment if they agree the note should be clarified or not.

|  |  |  |
| --- | --- | --- |
| **Company name** | **Agree / Disagree** | **Comments** |
| Ericsson | Agree | We agree the limitation comes from the MAC CE controlling PDCP duplication. |
| LG | Agree | What needs to be clarified is that 8 is maximum, according to the agreement in RAN2#101. Thus, we can change the NOTE as:  NOTE: maximum 8 per MAC entity with duplication. |
| CATT | Agree | Moreover, we think it’s better to clarify that the maximum number of DRBs configured with PDCP duplication with a MAC entity is 8‎. |
| MediaTek |  | We think that this NOTE is unclear and should be deleted as suggested by both option 1 and option 2 in 2.2. |
| OPPO | Agree |  |
| Apple | Agree | We should clarify the limitation is from MAC CE. |
| ZTE | Agree | The limitation is mainly from the Duplication Activation/Deactivation MAC CE defined in Rel-15. However, as the introduction of Duplication RLC Activation/Deactivation MAC CE, it is not clear whether such restriction still exist or not in Rel-16. |

## Number of RLC bearers

The need of clarifying the minimum UE requirement for the number of RLC bearers was discussed in RAN2#109bis-e meeting. There are two proposals submitted to this RAN2#101-e meeting.

**Option 1** ([R2-2004432](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004432.zip), [R2-2004433](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004433.zip); Qualcomm et al.):

* NR SA, NR-DC and NE-DC
  + 16 per UE
* (NG)EN-DC and EUTRA standalone
  + 15 per UE if the UE supports extendedNumberOfDRBs-r15.
  + 8 per UE if the UE does not support extendedNumberOfDRBs-r15.

**Option 2** ([R2-2005005](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005005.zip), [R2-2005007](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005007.zip); Huawei et al.):

* For NR
  + 16 per UE, if the UE does not support duplication (i.e. pdcp-DuplicationMCG-OrSCG-DRB or pdcp-DuplicationSplitDRB) or split bearers (i.e. splitDRB-withUL-Both-MCG-SCG); (NOTE 1)
  + 16 per cell group, if the UE supports split bearers (i.e. splitDRB-withUL-Both-MCG-SCG or pdcp-DuplicationSplitDRB), but does not support CA duplication (i.e. pdcp-DuplicationMCG-OrSCG-DRB);
  + 24 per cell group, if the UE supports CA duplication (i.e. pdcp-DuplicationMCG-OrSCG-DRB). (NOTE2)
* For EUTRA:
  + 8 per UE, if the UE does not support extendedNumberOfDRBs-r15, pdcp-Duplication-r15 or split bearer; (NOTE 1)
  + 8 per cell group, if the UE: (NOTE 3)
    - supports pdcp-Duplication-r15, but does not support extendedLCID-Duplication-r15, or
    - supports split bearer, but does not support extendedNumberOfDRBs-r15;
  + 15 per UE, if the UE supports split bearer, but does not support extendedNumberOfDRBs-r15. (NOTE 1)
  + 15 per cell group, if the UE: (NOTE 3)
    - supports pdcp-Duplication-r15 and extendedLCID-Duplication-r15, or
    - supports split bearer and extendedNumberOfDRBs-r15.

NOTE 1: It is FFS which “per UE” requirement (from NR or EUTRA?) is applied in case of (NG)EN-DC and NE-DC.

NOTE 2: This is also applicable to MCG of NR standalone (non-DC).

NOTE 3: This is also applicable to MCG of EUTRA standalone (non-DC).

The existence of the two proposals sufficiently motivates the need of clarification in the standard.

Companies are requested to comment if they support any of the options above.

|  |  |  |
| --- | --- | --- |
| **Company name** | **Option 1 / Option 2** | **Comments** |
| Ericsson | Neither | We don’t see a need to define the min number of RLC bearers supported by the UE. The Huawei papers shows how it can be derived from the number of DRBs supported, pdcp-DuplicationMCG-OrSCG-DRB, pdcp-DuplicationSplitDRB and split bearer support. Thus, the current requirement on number of DRBs is sufficient, and from this the requirement for number of RLC bearers can be derived, and thus there is already a requirement.  In fact, we think it would be problematic to introduce this min requirement on RLC bearers now according to option 1, as it would decrease the number of RLC bearers that the network expects the UE to support. This brings a backwards compatibility issue in existing networks. The 36.331 would affect also LTE DC, which is probably not the purpose.  If any limit is to be defined, it should be defined per cell group, not per UE.   * Introducing a requirement per UE would require addition of inter node signalling to coordinate the number between MN and SN.   As pointed out by Huawei, the per cell group requirement needs to take the used RAT into account, which is not possible when having a per UE requirement covering many MR-DC options. |
| Qualcomm Incorporated | Option 1 | I disagree with Ericsson’s comment. Huawei’s analysis shows exactly that the number of RLC the UE shall support is not entirely clear only from the set of UE capabilities and the number of DRBs. See the conflicting numbers suggested in the analysis.  It is acceptable for us not to define the requirement if the network vendors are willing to take the burden to figure out how many RLC bearers each single UE supports. |
| LG | None | We don’t see a need to define the minimum number of RLC bearers. |
| CATT | Neither | We don’t see a strong motivation to capture the requirement of the minimum number of RLC bearers. According to the analysis in Huawei’s contribution, it’s clear how to derive the minimum number of RLC bearers from the number of DRBs based on the different scenarios. Thus, the current spec is sufficient.  If companies still want to capture the requirement, we need carefully analysis different scenarios based on Huawei’s contribution. And also in R16, we need further consider the impacts on IIoT and IAB WIs, since more number of RLC bearers are needed in IIoT and IAB WIs. It will cause too complicate in the spec. |
| MediaTek |  | First we think that deduction from number of DRB is still unclear. Different companies will derive the requirement in different way. Thus it is better to have clear definition.  Based on the current NOTE “8 per MAC entity with duplication”, and MAC entity is per cell group. Our understanding on the requirement as following:  • In NR SA and NR-DC   * 16 NR RLC bearers per NR cell group (no matter CA or DC duplication is supported or not)   • In EN-DC and NE-DC   * 16 NR RLC bearers in NR cell group * 15 or 8 LTE RLC bearers in LTE cell group (15 if the UE support extendedNumberOfDRBs-r15)   • In LTE SA   * 15 LTE RLC bearers per UE (if the UE supports extendedNumberOfDRBs-r15) * 8 LTE RLC bearers per UE (if the UE does not support extendedNumberOfDRBs-r15) |
| OPPO |  | We share Mediatek’s view |
| Apple | Prefer to clarify | We have the same understanding on the current requirement as MediaTek, and we would like to have the clear definition in the spec. |
| ZTE | Neither | We share the view with Ericsson, and we don’t see the clear motivation to define the minimal number of RLC bearers supported by the UE. |

## Need of inter-node coordination

It was commented in RAN2#109bis-e meeting that some form of inter-node coordination between MN and SN may be necessary regarding the number of configured RLC bearers, when the minimum UE requirement, hence the limitation in the number of RLC bearers the UE supports, is clarified.

[R2-2004441](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004441.zip) points out that the current CG-ConfigInfo already includes mcg-RB-Config, which contains RadioBearerConfig of MN. In the RadioBearerConfig of MN, PDCP-config for each DRB indicates whether the DRB is configured with more than one RLC entities or not. This way, SN can learn how many RLC bearers are consumed by MN-terminated DRBs.

Companies are requested to comment if they agree to the observation above.

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| --- | --- | --- |
| **Company name** | **Agree / Disagree** | **Comments** |
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| Qualcomm Incorporated | Agree (proponent) |  |
| LG | Disagree | We don’t see a need to define the minimum number of RLC bearers, and thus don’t see a need for inter-node coordination of it. |
| CATT | Disagree | Please see our comments in section 2.2. |
| OPPO | Disagree |  |
|  |  |  |
| ZTE | Disagree | We don’t see the need to define the minimal number of RLC bearers supported by the UE.  In addition, since MN is to not required to update the RadioBearerConfig to SN, whenever new RLC bearer is established in MN side, we don’t think the RadioBearerConfig in CG-ConfigInfo can be used for RLC number coordination. . |

# Discussion: Part 2 (by June 10, 0700 UTC)

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# Conclusion

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# Reference

[1]