**3GPP TSG-RAN WG2 Meeting #118-e R2-220xxxx**

**Online, May 9th – May 20th, 2022**

**Agenda Item: 6.1.5**

**Source: ZTE**

**Title: [AT118-e][034][MBS] Other**

**Document for: Discussion and decision**

# Introduction

This email discusion is to address the concerns in following papers for NR MBS on stage 2, 37.340, and some further enhancements.

* **[AT118-e][034][MBS] Other (ZTE)**

Scope: Treat R2-2205625, R2-2205672, R2-2205482, R2-2205631, R2-2205484, R2-2205456. Collect one round of comments, pave the way for on-line agreement (identify agreeable points, discussion points),

Intended outcome: Report

Deadline: For online CB W1 Thursday

**38300 related**

R2-2205625 Miscellaneous correction to TS 38300 ZTE, Sanechips CR Rel-17 38.300 17.0.0 0463 - F NR\_MBS-Core

R2-2205672 Clarification on the support of MBS in MR-DC Apple discussion Rel-17 NR\_MBS-Core

R2-2205482 Correction on Stage 2 specs Huawei, HiSilicon CR Rel-17 38.300 17.0.0 0460 - F NR\_MBS-Core

R2-2205631 [Z606, Z607] Discussion on SDAP for NR MBS ZTE, Sanechips discussion Rel-17 NR\_MBS-Core

**37340 related**

R2-2205484 Addition of MBS related clarifications in 37340 Huawei, HiSilicon CR Rel-17 37.340 17.0.0 0318 - F NR\_MBS-Core

R2-2205456 Introduction of MBS for MRDC Xiaomi Communications CR Rel-17 37.340 17.0.0 0317 - B NR\_MBS-Core

**Further Enhancement**

R2-2204647 R17 MBS power saving enhancement aspect Shanghai Jiao Tong University discussion

R2-2205338 UE based PTM to PTP switch Sony discussion Rel-17 NR\_MBS-Core R2-2200905

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# Discussion

## 2.1 on MRB ID and PDCP issues

### MRB ID and PDCP SN length alignment between RAN nodes

"During handover, different gNBs may have assigned the same MRB ID to different sessions which requires release and addition of the MRB and leads to data loss", as was discussed in RAN2 117-e meeting (in R2-2203780 Offline043 MBS Invited tdocs open Issues CP (Nokia) Summary). Therefore, RAN2 agreed that,

* **MRB ID can be changed without releasing/adding MRB (delta config).**

The lastest 38331-h00 had addressed above agreements in stage 3 procedures to enable such MRB ID change without releasing and add MRB.

In R2-2205625 it was proposed one easy alternative: MRB ID alignment among RAN nodes (i.e., even before HO happens) based on the same manner as the synchronisation of MBS QoS flow to MRB mapping, which is done by network implementation. The provided CR is as follows:

|  |
| --- |
| Synchronisation in terms of MBS QoS flow to MRB mapping among gNBs is achieved by means of network implementation. The MRB ID and PDCP SN length of the corresponding MRB will be identical among gNBs by means of network implementation (e.g., MRB ID sync based on ranking of QFI value). |

The motivaton to leave the MRB ID alignment to network implementation instead of doing it on the fly with delta configuration includes:

- there are issues with current CR to the MRB add/mod procedure, and it needs further discussion on the solutions which are being proposed in various contributions [R2-2204670, R2-2204828, R2-2205249]

- if QoS flow to MRB mapping can be synced by network implementation, MRB ID sync which seems less complex can, too.

**Q1: Do companies agree with the below proposal:**

**Proposal: MRB ID among network nodes can be synced among gNBs by means of network implementation. Drop the support of MRB ID change without releasing/adding of MRB.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | No | We do not think it is motivated to override the below RAN2 agreement,   * **MRB ID can be changed without releasing/adding MRB (delta config).** |
| Lenovo | No | The MRB ID is dynamically allocated by the gNB. It should be difficult for different gNBs allocate the same MRB ID for a given MBS session.  QoS flow to MRB mapping can be synced by network implementation, e.g. all gNBs can applied one-one mapping easily. |
| Nokia | No | Less coordination between cells simplifies gNB implementation. and MRB ID can be easily changed also via delta signalling. Thus we don’t see any issue. |
| Samsung | No | We think there is no real motivation to change RAN2 agreement made earlier. |
| Futurewei | No | We think current agreement also allows network not to change the MRB ID. We can just leave it to network implementation. There is no need to change the agreement. |
| ZTE | Yes | the motivation is to be consistent with the existing 300 text that MBS flow to MRB mapping is synced among gNBs, and to have a more cleaner spec:  - if such complex flow to RB mapping can be synced, MRB ID sync is a just "by-product".  it is better to align the RB parameter beforehand, rather than re-configuring it on the fly which was not there for DRB:  - For MRB, it might result in bugs reported by companies in the procedures of add/mod MRB. we'd prefer to follow current add/mod model for DRB, i.e., not making multicast MRB an exception.  - we might have packets in the lower layer yet to be processed at UE side. it would force UE to maintain two sets of LCID to RB ID mappings temporarily otherwise this part of data will have to be discarded. |
| Huawei, HiSilicon | No | Similar views as most of others above. |
| Qualcomm | No | Disagree with reverting the previous agreement. RRC should be fixed instead, as discussed in another offline. |
| MediaTek | No | Agree with Futurewei |
| Intel | No | Agree with CATT. |
| OPPO | Yes | I wonder what is the scenario of changing the MRB ID value? |
| LGE | No | Same view with Nokia |
| Sharp | No | Change an agreement should be avoid if there is no serious issue. |
| TD Tech, Chengdu TD Tech | No |  |
| Spreadtrum | No | We cannot see the real motivation to revert the previous agreement. |
| vivo | No | MRB ID synchronization among gNB generally requires more complex coordination among network nodes. Alternatively, the target gNB can easily achieve a similar effect by MRB ID changing without releasing/adding MRB. So we fail to see the motivation to revert the achieved RAN2 agreement. |
| Xiaomi | No |  |
| Apple | No | We cannot see the motivation can revert the previous agreement. |
|  |  |  |

#### # moderator summary to Q1

It seems companies felt reluctant to reverse previous agreements which is OK. However there might be potential packet loss due to MRB ID change with delta configuration. Moderator suggests the following proposal to have it discussed further.

Proposal 1: RAN2 to discuss how to solve the issue of packet loss during MRB ID change with delta configuration, e.g., network implementation to avoid packet loss, or have MRB ID synced between source and target gNB beforehand.

The same principle can be applied to PDCP configuration as suggested by [R2-2205625], e.g., the PDCP configuration of the PDCP serving the MRB among gNBs, shall be identical to avoid MRB re-configuration and potential data loss.

**Q2: Do companies agree with the below proposal:**

**Proposal: For multicast MRB, PDCP SN length among network nodes can be synced among gNBs by means of network implementation.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | Yes | It is beneficial as we have agreed to sync PDCP SN among gNBs |
| Lenovo | NO? | the key point is the PDCP count value should be aligned. RAN3 already introduced 32bits MBS QFI SN for PDCP count value alignment among gNBs. Not sure whether the PDCP SN length needs be aligned or not. |
| Nokia | ~ | Why do we need to speculate on coordination on the network side? |
| Samsung | No | Same views as Lenovo |
| Futurewei | No | When the network sync PDCP SN to be the same among gNBs, wouldn’t include that the SN length is already in sync? Otherwise, not clear how to make sure the SN insync all the time. |
| ZTE | Yes | the spec only says PDCP COUNT sync (the per flow SN from GTP-U is 32 bit which equals the length of COUNT rather than PDCP SN) as suggested by R2-2205482 & R2-2205625.  this indeed looks like a network coordination issue from another WG (e.g., coordination about SN length between gNBs to avoid any issue on network interface).  however, it has resulted in related consequences on Uu in RAN2 and it needs to be figured out in RAN2, e.g.,  - current h00 spec seems to be indicating delta configuration to modify the *pdcp-SN-SizeDL* is OK which is not allowed in fact. |
| Huawei, HiSilicon |  | Not clear what “network implementation” means here. It is possible to have OAM to configure something to the gNBs, and PDCP SN length can be aligned. We don’t see a need to discuss/agree or capture anything in specification. |
| Qualcomm | - | Key point in COUNT, which should be aligned across gNBs by the network. |
| MediaTek | Yes | It’s better to align PDCP SN length among gNBs to ensure the sync of COUNT value with network implementation |
| Intel | - | Agree with Lenovo. The key aspect for lossless HO is that the same PDCP SDU have the same PDCP COUNT across different gNBs. |
| OPPO | Yes | No strong view. |
| LGE | No | Same view with Lenovo |
| Sharp | No | Agree with Lenovo. |
| Spreadtrum | No | Same views as Lenovo |
| vivo | No | We share a similar view with Nokia and Lenovo. |
| Xiaomi | No |  |
| Apple | No | Agree with Lenovo. |
|  |  |  |

#### # moderator summary to Q2

4 companies supported the proposal, while the left 13 objected it.

The current spec requires only PDCP COUNT value synced among gNBs for lossless HO, but there is no requirement on whether PDCP SN size is the same among gNBs.

In mobility between supporting gNBs, the PDCP SN size configured by source and target could be different. It is possible that the source and the target own different PDCP SN size, e.g., source - 12bit, target - 18bit. In the delta configuration from target to source, *pdcp-SN-SizeDL* will have to be reconfigured, which is against current RRC spec. And this is a RAN 2 issue indeed.

To the opposite, having PDCP SN size synced together with the QoS flow to MRB mapping sync is an easy solution that will not make the spec broken.

Note: the wording is updated from PDCP SN length to PDCP SN size to be aligned with the spec.

Moderator suggests this proposal to be discussed further:

Proposal 2: RAN2 to discuss whether pdcp-SN-SizeDL can be re-configured during HO with delta configuration, if such parameters are differently configured by source and target gNB.

**Q3: Besides the PDCP SN length, are there any other PDCP config that needs to be synced between RAN nodes, e.g., ROHC?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | No | Not necessary from RAN2 point of view |
| Lenovo | No | RoHC continuity should be same with legacy. If PDCP relocation happens, RoHC continuity is not possible. |
| Nokia | No | We don’t understand the purpose of such a discusion for RAN2 |
| Samsung | No | Not in RAN2 scope |
| Futurewei | No | Don’t see the need. |
| ZTE | no |  |
| Huawei, HiSilicon | No | Agree with others above. No need for such discussion. |
| MediaTek | No |  |
| Intel | No | ROHC aspect can be handled by network implementation, e.g. target gNB can send IR packets using PTP link. |
| OPPO | Yes | It is better to align the ROHC in one area and UE can contune the ROHC during cell reselection in this area. It can reduce the data loss during cell reselecton. |
| LGE | No |  |
| Sharp | No |  |
| TD Tech, Chengdu TD Tech | No |  |
| Spreadtrum | No | No need for such discussion. |
| vivo | No | We think ROHC for MRB has no new requirement, i.e. legacy performance is good enough. |
| Xiaomi | No |  |
| Apple | No |  |
|  |  |  |

**# moderator summary to Q3**

This is a question related to Q2 to see whether other PDCP config needs to be aligned among gNBs to avoid unexpected contradictions in spec. One company suggest ROHC shall be considered. Since ROHC is possible with MRB with network implementation flexibility:

* **ROHC O/R-mode can be used for MRB, for cases when feedback path is available (UL RLC). R2 assumes the detailed operation is up to implementation and expect no further optimizations to be needed.**

Although the ROHC profile and context might be configured differently at source and target, company suggested that ROHC aspect can be handled by network implementation, e.g. target gNB can send IR packets using PTP link.

No proposal is made for this question.

### PDCP wrap-around issue

Since PDCP SN/COUNT for one MRB is based on the per QoS flow SN on the GTP-U tunnel, the legacy method of how network prevents PDCP COUNT wrap-around might not work, in case

- MB-UPF is not aware of the PDCP COUNT wrap-around issue, and allocates one large PDCP COUNT value for the MRB; or

- MB-UPF is aware and reset the per flow SN on GTP-U,

In either cases, gNB needs to react accordingly. In R2-2205625 it was proposed to add one note similar to legacy way to let gNB handle this issue but follows the SN from GTP-U :

|  |
| --- |
| NOTE 1: Synchronisation of PDCP SNs in case user data for MBS QoS flows mapped to the same MRB arrive over NG-U at different gNBs in different order or in case of loss of data over NG-U, and related handling of minimisation of data loss is left to implementation.  NOTE 2: Since PDCP does not allow COUNT to wrap-around, it is up to the network to prevent it from happening (e.g., based on its observation on DL MBS QFI Sequence Number, gNB might initiate a release and add of the corresponding multicast radio bearer or a full configuration to the associated UEs). |

// the same issue might be addressed under "[AT118-e][032][MBS] PDCP (Xiaomi)", we will see how it goes to avoid duplicated work.

**Q4: Do companies agree with the below proposal:**

**Proposal: To aviod PDCP COUNT wrap-around, add the following note in stage 2 spec:**

**"Note 2: Since PDCP does not allow COUNT to wrap-around, it is up to the network to prevent it from happening (e.g., based on its observation on DL MBS QFI Sequence Number, gNB might initiate a release and add of the corresponding multicast radio bearer or a full configuration to the associated UEs)."**

**Companies are encouraged to provide solutions other than the ones in above note.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | Yes |  |
| Lenovo | Yes |  |
| Nokia | No | Note that is also discussed in 032. |
| Samsung | No | PDCP does not allow it at all. NW does not need to prevent what it’s not alled |
| Futurewei |  | If we just follow the exist PDCP rule, seems no need to add new note. |
| ZTE | Yes | We are seeing new cases here that PDCP at RAN side has no right to allocate the COUNT value, but it follows the sequence number from GTP-U.  - in legacy, network always take some actions to reset the COUNT value to prevent wrap-around issue proactively, e.g., by release/add.  - in current spec for NR MBS, things can be unexpected which is not favored.  it would be better to assume the worst case, other entities out of RAN (i.e., MB-UPF who allocates the GTP-U SN), would not be able to and shall not consider the access layer wrap-around issue of some kind of unknown SN at all. (we shall strive to avoid such cross layer coupling)  we'd like to follow the same wording in 38300 for unicast to prevent COUNT wrap-around, but with clearer guidance. |
| Huawei, HiSilicon | No | Can be up to implementation without spec change (our view is CN should handle this). This is also being discussed in Q6 of offline 32. |
| Qualcomm | No | Also discussed in offline [032] which is specific to PDCP. We think current spec is enough but ok with conclusion from [032]. |
| MediaTek | No | There is no difference to legacy PDCP rule, so no need to add new note |
| Intel | No |  |
| OPPO | Yes |  |
| LGE | No | We think there is the same issue in legacy unicast transmission. We also think that it can be prevented by network implementation. However, it does not need to be specified further. |
| Sharp | No |  |
| TD Tech, Chengdu TD Tech | No |  |
| Spreadtrum | No | It can be up to implementation and no specific change is needed. |
| vivo | No | We don’t see the need to specify anything for the NW implementation. |
| Xiaomi | No |  |
| Apple | No |  |
|  |  |  |

#### # moderator summary to Q4

This question overlaps with the one in [032] and moderator suggests it to be discussed there with other PDCP issues. No proposal is made.

CRs to 38300 on PDCP COUNT value assignment

In [R2-2205625 R2-2205482], company proposed it should be PDCP COUNT value that is derived based on the per flow SN on GTP-U, instead of PDCP SN, e.g., MBS QFI SN is 32 bits. PDCP COUNT instead of PDCP SN should be equal to MBS QFI SN in Section 16.10.5.1.

**Q5: Do companies agree with the changes proposed in R2-2205625 and R2-2205482 on PDCP COUNT value assignment?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | Yes |  |
| Lenovo | Yes | We may need to avoid the duplicated discussion in RAN2 and RAN3. We would prefer to let the issue to RAN3 who is responsible for the issue. |
| Nokia | Yes | In our understanding R2-2205482 proposes it (R2-2205625 does not). |
| Samsung | - | We think this should be addressed by RAN3 |
| Futurewei | Yes |  |
| ZTE | Yes | agree with Nokia that we'd like to follow the suggested wording from 5482 instead of 5625, although the two shared the same intention. |
| Huawei, HiSilicon | Yes | Proponent |
| Qualcomm | Yes | Agree with Nokia comment, this question/response is about R2-2205482 only. |
| MediaTek | Yes |  |
| Intel | Yes |  |
| OPPO | Yes |  |
| LGE | Yes |  |
| Sharp | Yes |  |
| TD Tech, Chengdu TD Tech | Yes |  |
| Spreadtrum | Yes |  |
| vivo | Yes | Fine with changing the terminology “PDCP SN” to “PDCP COUNT”. |
| Xiaomi | Yes |  |
| Apple | Yes |  |
|  |  |  |

#### # moderator summary to Q5

**All companies agree to change it to PDCP COUNT instead of PDCP SN that equals to MBS QFI SN in Section 16.10.5.1 of 38.300.**

Proposal 3: Confirm the CR in R2-2205482 to 38300 Section 16.10.5.1: PDCP COUNT instead of PDCP SN should be equal to MBS QFI SN.

CRs to 38300 on the figure of Downlink Layer 2 Architecture

In [R2-2205482], company proposed that, for split MRB, the split point shall be changed to "below" PDCP layer but not "in" PDCP layer in Figure 16.10.3-1, as it was agreed by RAN3 that the determination point of PTP amd PTM switch should be DU.

**Q6: Do companies agree with the changes proposed in [R2-2205482] to modify figure of Downlink Layer 2 Architecture?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No? | Comments |
| CATT | Yes |  |
| Lenovo | Yes |  |
| Nokia | Yes | Should have been checked with Rapporteur first. |
| Samsung | Yes |  |
| Futurewei | Yes |  |
| ZTE | Yes | Thanks to Nokia for the kind reminder, we will contact Rapporteur on how to handle the CRs, for both that needs discussion the also the editorial ones. |
| Huawei, HiSilicon | Yes | Proponent |
| Qualcomm | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes |  |
| OPPO | Yes |  |
| LGE | Yes |  |
| Sharp | Yes |  |
| TD Tech, Chengdu TD Tech | Yes |  |
| Spreadtrum | Yes |  |
| vivo | Yes |  |
| Xiaomi | Yes |  |
| Apple | Yes |  |
|  |  |  |

**# moderator summary to Q6**

**All companies agree to change it to PDCP COUNT instead of PDCP SN that equals to MBS QFI SN in Section 16.10.5.1 of 38.300.**

Proposal 4: Confirm the CR in R2-2205482 to 38300: for split MRB, the split point shall be changed to "below" PDCP layer but not "in" PDCP layer in Figure 16.10.3-1.

## 2.2 other CR to 38.300

### CRs to 38300 on usage of RAN node or gNB

In [R2-2205625], company proposed to change the "RAN node" in text to "gNB" as NR MBS in Rel-17 is only for gNB.

**Q7: Do companies agree with the changes proposed in [R2-2205625] on usage of RAN node or gNB?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | - | Not essential.there is no ambiguity in the spec 38.300,  16.10 Multicast and Broadcast Services  16.10.1 General  NR system enables resource efficient delivery of multicast/broadcast services (MBS). |
| Lenovo | Partially Yes | We agree the MBS is only applited to NR.  We would like to have a high level clarification instead of using the term of ‘gNB’ directly. |
| Nokia | - | Should be discussed in RAN3.  Should have been checked with Rapporteur. |
| Samsung | Seems fine | gNB term has already been used for MBS description in 38.300, except some places where NG-RAN is used. |
| Futurewei |  | Seems ok to have existing generic term at stage 2. |
| ZTE |  | Thanks to Nokia for the kind reminder, we will contact Rapporteur on how to handle the CRs.  The term being used will be discussed there (e.g., maybe a second round of discussion specifically on corrections). |
| Huawei, HiSilicon |  | Same view as Lenovo. We can have a high level clarification. Maybe 37.340 CRs in 2.4 can handle this. |
| Qualcomm | Yes |  |
| MediaTek | No strong view |  |
| Intel | - | We don’t have strong view. |
| OPPO | Yes |  |
| LGE | - | No strong view |
| Sharp |  | We don’t have strong view. |
| Spreadtrum | Yes |  |
| vivo | No strong view | We would like to leave this up to the spec rapporteur. |
| Xiaomi | No strong view |  |
| Apple | No strong view |  |
|  |  |  |

**# moderator summary to Q7**

This part of CR will be handled by spec Rapporteur in later stage since views are diverse, and it could be handled case by case. No proposal is made.

other CRs to 38300 other than editorial changes

**Q8: Do companies agree with other changes proposed in [R2-2205625]?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No? | Comments |
| CATT |  | OK with the Editorial correction |
| Nokia | Not entirely | RAN3-related changes should be discussed in RAN3.  Not all RAN2-related changes are needed.  Should have been checked with Rapporteur. |
| Samsung |  | OK for editorial corrections which are in RAN2 scope |
| Futurewei |  | Ok for editorial corrections. |
| ZTE |  | Thanks to Nokia for the kind reminder, we will contact Rapporteur on how to handle the CRs.  The term being used will be discussed there (e.g., maybe a second round of discussion specifically on other corrections). |
| Huawei, HiSilicon |  | For editorials which don’t need to be discussed based on MBS expertise, we agree that we should leave them to spec rapporteur. Otherwise, it should be specifically discussed.  As they are not essential, it is also ok to leave them to future meetings. |
| Qualcomm |  | Ok in general with other corrections not discussed above. |
| MediaTek |  | Ok for editorial corrections. |
| Intel |  | OK with the editorial corrections. |
| OPPO | Yes |  |
| LGE |  | OK for editorial corrections |
| Sharp |  | Ok for editorial corrections. |
| TD Tech, Chengdu TD Tech |  | Ok |
| Spreadtrum |  | OK for editorial corrections |
| vivo | Comments | OK about the editorial corrections |
| Xiaomi |  | OK for editorial corrections |
| Apple |  | OK for editorial corrections. |
|  |  |  |

**# moderator summary to Q8**

Following the suggestions of companies, this part of CR will be handled by spec Rapporteur in later stage. No proposal is made.

## 2.3 on CA support

R2-2205672 proposed that in the MCG with CA configuration, the PTP transmission may be via the same or different serving cell from the cell for PTM transmission. and proposed that 'The multicast MRB can be configured with one PTP link and/or one PTM link in CA.'

**Q9: Do companies agree with the below proposal:**

**Proposal: The multicast MRB can be configured with one PTP link and/or one PTM link in CA**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | No | The proposal is against the RAN1#108e agreement,UE should not be require to receive multicast on Pcell and Scell simultaneously. |
| Lenovo |  | For PTP only link, we are wondering why have such kind of limitation. The gNB may schedule the PTP new transmission in any serving SCells? |
| Nokia |  | First, R2-2205672 should have given references of the agreements to allow checking the corresponding discussions.  We are actually wondering the scope of the RAN1 agreement. As Lenovo commented, the restrictions for PTP would seem counter intuitive. |
| Samsung | No | An MRB (split bearer) can have PTM and PTP links only on same serving cell |
| Futurewei |  | Ok to have clarifications based on the agreements. |
| ZTE |  | agree with the intention from 5672.  however the current wording seems a bit unclear:  - for scheduling of the packet from PTP leg, we share the same view with Lenovo that spec wont make a limitation on which carrier to use (just like legacy CA scheduling for unicast) and transparent to UE.  - for scheduling of the packet from PTM leg but re-tx in PTP, there might be RAN1 limitations, the same carrier applies.  therefore, we tend to think the clarification is not needed in stage 2 spec. |
| Huawei, HiSilicon |  | Agree with Lenovo/Nokia that the proposal is a bit confusing. Not clear what one PTP link means here. One PTP RLC entity or one Serving cell for PTP (which is clearly not correct)?  Note that RAN1 agreements never concern about the PTP RLC entity we agreed in RAN2. |
| Qualcomm | - | Agree with Samsung’s comment above. We think both PTM and PTP links should be on the same serving cell. |
| MediaTek | No | Share the same view with CATT |
| Intel | Yes | Our understanding is that RAN1 agreement is only related to PTM reception. There is no restriction regarding PTP reception. |
| OPPO | No | In my understanding, the CA is not supported for multicast, e.g. SPS for multicat can be configured only on PCell. So no matter PTM or PTP, the data will be transmitted only on PCell. |
| LGE | No | The proposal is unclear. Referring to Q6, the split point is between PDCP and RLC. There is no need of further clarification for CA. |
| Sharp | No | Share Samsung’s view. |
| TD Tech, Chengdu TD Tech | No |  |
| Spreadtrum |  | We are not sure whether this configuration will conflict with the RAN1 agreement “UE should not receive multicast on Pcell and Scell simultaneously”. |
| vivo | No | We think PTM initial transmission and corresponding PTP retransmission must be in the same cell for the sake of HARQ soft combining (which is maintained basis on per serving cell level).  For other cases, PTM RLC bearer transmission will be always located in MBS cell and PTP RLC bearer transmission can be aligned with DRBs, i.e. multiple carriers scheduling in CA configuration. |
| Xiaomi | No | The gNB can schedule the DL MRB data via any cell. The motivation of such restriction is not clear. |
| Apple | Yes | The intention of the proposal is to clarify that in CA the UE can be configured with at most **1** PTP RLC entity and/or **1** PTM RLC entity for each MRB.  For the serving cell restriction, our understanding is that for new transmission the PTP and PTM could be on the different serving cells in CA case. If companies view are different, we think some clarification is needed. |
|  |  |  |

**# moderator summary to Q9**

As clarified by proponent, the intention of the paper is about the number of RLC entity configured for MRB in case of CA. It seems this was already captured in 38.300 and 38.323. So no proposal is made for this part.

Interestingly, companies views are split on whether the PTP leg can be scheduled on different carriers.

RAN1 indeed had an agreement, "UE is not expected to be configured simultaneously with more than one component carrier for multicast reception." Although there is no explicit indication to say the limitation is only for the service data from PTP or PTM leg, it is obvious that from UE perspective, how network schedules of PTP leg data is transparent in PHY layer. That is to say, whether PTP scheduling (this should exclude the PTP retransmission for PTM) is for unicast data or from PTP leg of MRB, is unknown to UE.

Therefore, it will be network implementation to do so, i.e., no text to limit anything is to be captured in spec.

No proposal is suggested.

R2-2205672 also proposed that to fully capture the spirit of the stage 2 RAN1 agreements, add the self scheduling limitation into stage 2 description.

|  |
| --- |
| RAN1 agreements (Broadcast MBS in CA)  From RAN1 perspective, it is feasible for UE in RRC\_CONNECTED state to receive MBS broadcast on an activated SCell as long as UE has capability of supporting MBS broadcast on SCell. From RAN1 perspective, if a UE is to receive MBS broadcast on SCell,   * + The capability of supporting MBS broadcast on SCell is separate capability from the one of CA for unicast.   + The UE is not required to monitor DCI formats associated with SI-RNTI, P-RNTI, RA-RNTI in SCell.   + Overbooking for SCell is not supported.   + MBS broadcast reception on SCell can be supported only for RRC\_CONNECTED UEs only with self-scheduling.   + Type0-PDCCH CSS set is only configured on the primary cell of the MCG.   + Configuring the search space on SCell for PDCCH monitoring of MBS DCI formats is via unicast RRC signaling.   + The UE capability is expected to be defined by RAN2.     - E.g. the total number of component carriers for receiving broadcast on SCell may be subject to UE capability   + The UE is not required to receive broadcast on PCell and SCell simultaneously |
| RAN1 agreements on CA (Multicast MBS in CA)  If UE supports carrier aggregation for unicast, multicast reception on an activated SCell with self-scheduling is supported subject to UE capability in Rel-17.   * + UE is not expected to be configured simultaneously with more than one component carrier for multicast reception.   + Cross-carrier scheduling for multicast reception is not supported in Rel-17.   + The capability of supporting MBS multicast on SCell is a separate capability from the CA capability for unicast.   + The granularity of UE reporting the capability of supporting MBS multicast reception is per FSPC |

**Q10: Do companies agree with the below proposal:**

**Proposal: Capture "UE can receive the MBS multicast data on one activated SCell with self-scheduling" and "UE can receive the MBS broadcast data on SCell with self-scheduling" in the section of Support of CA for multicast and broadcast, respecitvely, based on RAN1 agreements.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Lenovo |  | For broadcast and PTM, it is fine. For PTP only link, we are wondering why have such kind of limitation, which should be same with unicast. |
| Nokia | No | RAN1 should make the corresponding changes. |
| Samsung | No strong view | It seems to add clarity in 38.300 |
| Futurewei | No | Don’t see a need to repeat RAN1 spec. |
| ZTE |  | agree with Lenovo that  - the concept of MBS multicast data is broad, that PTP can be scheduled on any SCell in a way that network prefers if UE capability allows. |
| Huawei, HiSilicon | No | The language is not like RAN2 text. It is better to further check if this has been captured in any RAN1/RAN2 spec in one way or another. |
| Qualcomm | Yes | RAN1 already agreed. Stage 2 may be made clearer. |
| MediaTek | Yes | Ok to add these clarifications |
| Intel | - | The terminology “self-scheduling” is not defined in TS 38.300. If it is to be captured, it is better to have a clear definition.    Regarding “UE can receive the MBS multicast data on one activated SCell with self-scheduling”, it should be noted that similar text is already captured in mega CR R2-2204838, as below:  NOTE: UE is not expected to be configured simultaneously with more than one component carrier for multicast reception. |
| OPPO | No | In my understanding, the CA is not supported for multicast, e.g. SPS for multicat can be configured only on PCell. So no matter PTM or PTP, the data will be transmitted only on PCell. |
| LGE | No | The current text seems fine for stage-2 level description. |
| TD Tech, Chengdu TD Tech | No |  |
| Spreadtrum | No | “Support of CA for multicast” is not clear. |
| vivo |  | Let RAN1 decide whether and how to capture them. |
| Xiaomi | No strong view |  |
| Apple | Yes | We prefer to make the UE operation on the multicast MBS reception in CA case clear in stage-2 spec, based on both RAN1 and RAN2 agreements. |
|  |  |  |

**# moderator summary to Q10**

This is about a clarification to record RAN1 agreement to RAN2 stage 2 spec. Moderator suggests not to record it here:

1/ RAN1 should make the corresponding changes.

2/ the wording is not clear and can be confusing to RAN2, the description on "MBS multicast data" can be vague, how network treats broadcast/PTM and PTP is different.

3/ majority think it is not needed.

No proposal is made.

## 2.4 on MR-DC support

RAN2 made the following agreements on MR-DC support to NR MBS:

* **Multicast MBS can be supported in MCG side in NE-DC and NR-DC scenarios, i.e., MN terminated MCG bearer kind of MRB.**
* **MBS on SCG is not supported (unless the UE can support it without specific DC coordination for Broadcast).**

R2-2205484 and R2-2205456 proposed CRs to 37.340 to clarify how the WI result of Rel-17 NR MBS on the support of MR-DC can be reflected.

- update the definition of MCG bearers and User plane resource configuration;

- add a new section 13.x to clarify the MBS applicable architectures as in R2-2205484. or

- similarly add " Multicast MRB is only supported in MCG of NR-DC/ NE-DC. Broadcast MRB is supported in MCG of NR-DC/ NE-DC, or SCG of NR-DC/ NGEN-DC." in the general description in section 4.2.2.

There might be another alternative, suggested by the moderator, which is to keep the impacts to 37.340 minimum and to reflect RAN2 agreements in 38.300 instead.

Current agreements suggests that, for one UE that happen to be working in MR-DC mode, the MBS will only be configured to cells in MCG. It further indicates that the existing MR-DC frame work is totally decoupled from the support of NR MBS, therefore impacts to 37.340 can be minimized. Capture the above RAN2 agreements into 38.300 might be sufficient.

**Q11: Do companies agree with the changes proposed in R2-2205484 and R2-2205456 to clarify how the WI result of Rel-17 NR MBS on the support of MR-DC can be reflected?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | No strong view | It seems text in 38.300 is sufficient. |
| Lenovo | Yes | It would be better to capture it in the spec of 37.340 |
| Nokia | No strong view | Should have been checked with Rapporteur first  Regarding R2-2205484, doesn’t seem that the change to MCG bearer definition is needed. |
| Samsung | No strong view |  |
| Futurewei | No strong view | If adding clearifications, on 38.300 would be sufficient since DC here is just a scenario and no DC functions is involved for MBS. |
| ZTE | slightly prefer not | the intention of the agreements made for Rel-17 NR MBS is to limit the scheduling of MBS in a single cell group that where the UE's CP is associated with (MCG). That is to say, DC is not necessarily "visible" to MBS, although it is visible to UE.  from this perspective, we tend to believe there is no strong need to make MBS itself visible to 37.340 in current release.  simply put the agreements by RAN2 into 300 would be sufficient:   * **Multicast MBS can be supported in MCG side in NE-DC and NR-DC scenarios, i.e., MN terminated MCG bearer kind of MRB.** * **MBS on SCG is not supported (unless the UE can support it without specific DC coordination for Broadcast).**   we'd like to have it checked with the corresponding Rapporteur depending on the result of the discussion. |
| Huawei, HiSilicon | Yes | Proponent of R2-2205484. Can try to merge the two and have an offline to discuss the changes.  One intention should be to simply clarify NR MBS is only supported in NR MCG (with this we don’t need change all “RAN node” to “gNB”). |
| Qualcomm | Partly | R2-2205456, section 4.2.2, we think for simplicity, SCG of NR-DC/ NGEN-DC should be excluded for Broadcast MRB. i.e., as follows:  Multicast MRB is only supported in MCG of NR-DC/ NE-DC. Broadcast MRB is supported only in MCG of NR-DC/ NE-DC~~, or SCG of NR-DC/ NGEN-DC~~. |
| MediaTek | No strong view |  |
| Intel | Yes | The change in R2-2205484 is OK. |
| OPPO | No strong view |  |
| LGE | No | We have similar opinion with the rapporteur. |
| TD Tech, Chengdu TD Tech | No strong view |  |
| Spreadtrum | No strong view |  |
| vivo | No strong view |  |
| Xiaomi | Yes | We are the proponent of R2-2205456, the 38.300 specification does not provide clear text on how broadcast MBS is supported via SCG. We are also fine to merge the two CRs via offline discussion. Furthermore, we do not see any extra complexity is required to support the SCG for broadcast MBS, but we are fine to follow the majority view. |
| Apple | No strong view |  |
|  |  |  |

**# moderator summary to Q11**

The number of companies views on whether we need to have an CR to MRDC spec for NR MBS.

- No strong view: 10

- Yes: 5 (partly yes will be a yes)

- No: 2

12 in 17 expressed that there is no strong motivation to capture how MBS is scheduled in scenarios where UE is configured with MRDC in 37340.

Moderator suggests that putting the agreements by RAN2 into 300 would be sufficient:

* **Multicast MBS can be supported in MCG side in NE-DC and NR-DC scenarios, i.e., MN terminated MCG bearer kind of MRB.**
* **MBS on SCG is not supported (unless the UE can support it without specific DC coordination for Broadcast).**

**Proposal 5: Capture the following RAN2 agreement in TS 38.300**

**- "Multicast MBS can be supported in MCG side in NE-DC and NR-DC scenarios, i.e., MN terminated MCG bearer kind of MRB"**

**- "MBS on SCG is not supported (unless the UE can support it without specific DC coordination for Broadcast)."**

## 2.5 on SDAP configuration

it was proposed that in R2-2205631 SDAP entity is not visible to UE and not needed in stage 3, since

- RAN2 agrees there is no SDAP configuration provided to the UE for neither broadcast nor multicast.

- Current RRC configuration, no SDAP config is delivered to UE either.

It was further stated that the current cross reference can cause contradiction between 38.331 and 37.324.

Therefore RAN2 might need to discuss whether to have SDAP configured at UE side and related stage 3 impacts.

**Q12: Do companies agree SDAP entity is not needed at UE side?**

**Companies are encouraged to provide solutions to address potential contradiction between 38.331 and 37.324.**

|  |  |  |
| --- | --- | --- |
| Company | Need/no need | Comments |
| CATT | Need | We do not see any contradiction between 38.331 and 37.324.  SDAP entity is needed at UE side.In 37.324,the behaviour of SDAP entity is described as below, 5.2.2 Downlink At the reception of an SDAP data PDU from lower layers for a QoS flow, the receiving SDAP entity shall:  - if this SDAP data PDU is received from an MRB:  - retrieve the SDAP SDU from the DL SDAP data PDU as specified in the clause 6.2.2.1. |
| Lenovo | Need | Remove SDAP descriptions for NR MBS in 331. |
| Nokia | - | SDAP could be configured as transparent. |
| Samsung | Need | SDAP entity is needed at UE side and present specification 37.324 and 38.331 are rightly reflecting the description. No spec change is needed. |
| Futurewei | Need | SDAP is needed and configured for QoS mapping in MBS. |
| ZTE | no strong view | if companies can accept the "transparent" SDAP, that is configured without real config from network, and does not handle packets. |
| Huawei, HiSilicon | Needed | Agree with others above |
| Qualcomm | Need |  |
| MediaTek | Need | SDAP entity is needed at UE side for QoS mapping |
| Intel | Need | Agree with CATT |
| OPPO | No strong view | There is SDAP entity in gNB and it make sense to configure a peer SDAP also in UE side. But the SDAP is only used for down reception and there is no UL data transmission. So the SDAP in UE side has no special configuration and it is transparent. |
| LGE | Need | Since NW side has a SDAP entity, the peer entity is required on UE side. We understand that MBS data packets pass SDAP entity without processing. It’s same with ‘Data PDU without SDAP header’ case of legacy unicast transmission. |
| Sharp | Need |  |
| TD Tech, Chengdu TD Tech | Need |  |
| Spreadtrum | Need |  |
| vivo | Need | The current description is accurate and clear. |
| Xiaomi | No strong view | This can be left to the UE implementation. |
| Apple | Need |  |
|  |  |  |

**# moderator summary to Q12**

It seems current spec is clear enough for all companies. The spec will stay as it is.

No proposal is made.

## 2.6 on further enhancement

In R2-2204647 it was proposed to support UE based indication to stop MBS reception in the graularity of MRB. further solutions like implicit indication of stoping UL feedback can be used for such stop indication. However, such enhancement might not work in case of MBS which is common for a group of UE. And the UL feedback based indication might not work since UL feedback itself is an optional feature.

In in R2-2205338 it was proposed to enable UE to trigger the mode switch (for split MRB) or MRB bearer type change. Although it brings some benefits, e.g., power efficiency, and quick response to better utilize the mode switching feature, it is questionable about the feasibility to apply such enhancement at this stage.

**Q13: Do companies agree with the further enhancement in R2-2204647 and R2-2205338?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | No | We think R2-2204647 and R2-2204647 are not in the scope of this offline discussion as indicated by chair.and it is not motivated to pursue such further enhacements at this stage. |
| Lenovo | No | The UE can request ‘leave’ the multicast group if it does not want to receive the multicast session. |
| Nokia | No |  |
| Samsung | No |  |
| Futurewei | No |  |
| ZTE | No |  |
| Qualcomm | No | Unclear if the question is about a single document or there is a typo. We don’t think enhancements in 4647 are needed. |
| MediaTek | No |  |
| Intel | No |  |
| OPPO | No |  |
| LGE | No |  |
| Sharp | No |  |
| TD Tech, Chengdu TD Tech | No |  |
| Spreadtrum | No |  |
| vivo | No |  |
| Xiaomi | No |  |
| Apple | No |  |

**# moderator summary to Q13**

It seems clear in RAN2 that further enhancement is not needed at current stage.

No proposal is made.

## 2.7 other issues?

**Q14: Any other issues that was proposed by companies but not addressed in above questions/proposals?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
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|  |  |  |
|  |  |  |

# Conclusions

Based on the discussion above, we propose:

# Reference