**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:

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| --- |
| 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.**

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| --- | --- | --- |
| 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.  |

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.**

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

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| --- | --- | --- |
| 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 |  |
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### 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 :

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| --- |
| 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.**

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| --- | --- | --- |
| 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. |

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?**

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| --- | --- | --- |
| 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. |
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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?**

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| --- | --- | --- |
| 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. |
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## 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?**

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| --- | --- | --- |
| Company | Yes/No | Comments |
| CATT | - | Not essential.there is no ambiguity in the spec 38.300,16.10 Multicast and Broadcast Services16.10.1 GeneralNR 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). |

other CRs to 38300 other than editorial changes

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

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| --- | --- | --- |
| 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). |

## 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**

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| --- | --- | --- |
| 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. |
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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.

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| 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.**

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| --- | --- | --- |
| 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. |

## 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?**

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| --- | --- | --- |
| 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 firstRegarding 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. |
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## 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.**

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| --- | --- | --- |
| 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 DownlinkAt 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. |

## 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 R2-2204647 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 R2-2204647?**

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| --- | --- | --- |
| 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  |  |
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## 2.7 other issues?

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

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| Company | Yes/No | Comments |
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# Conclusions

Based on the discussion above, we propose:

# Reference