3GPP TSG-RAN WG3 #116-e R3-223818

Online, 9th - 19th May 2022 was R3-223691

Agenda Item: 9.1.6.1.1

Source: Ericsson(moderator)

Title: CB: # MBS2\_Service\_Continuity - Summary of email discussion

Document for: Discussion

# Introduction

chair summary:

**CB: # MBS2\_Service\_Continuity**

**- FFS on "Consent to Apply Available Shared UP MBS QoS flow mapping", the related E1AP procedure on how the consent works?**

- affected spec: E1AP, 38401

- R3-223672 (ZTE) / R3-223282 R3-223283 R3-223284 (SS) / R3-223627 R3-223628 R3-223629 (HW)/ R3-223456 (Nokia)

**- Whether and how Rel-17 should support the possibility to modify both, RAN and CN side terminations of the shared NG-U bearer?**

- affected spec: NG-C

- R3-223379 (Ericsson)

**- Whether Data Forwarding Response MRB List IE within the MBS Session Information Response Target to Source List as an optional IE?**

- affected spec: XnAP

- R3-223379 Ericsson

**- Whether to have end marker from 5GC at handover from supporting to non-supporting node?**

- affected spec: 38300

- R3-223452 (Nokia)

**- How to apply data forwarding from supporting to non-supporting node?**

- affected spec: 38300

- R3-223604 (ZTE)

**- FFS whether to add an indication of which MBS session is active?**

- affected spec: 413/423

- R3-223077 R3-223078 HW / R3-223631QC / R3-223185 R3-223187 R3-223188 (NEC) / R3-223379 Ericsson

**- MBS Session Status indication in NGAP/XnAP?**

- affected spec: XnAP, NGAP

- R3-223185 R3-223187 R3-223188 (NEC),

**- Clean-up work on following specif found needed**

- 38401 38410 38420 38460 38470

- ref tdoc: R3-223096 (QC) etc.

**- LS out if needed (e.g., to RAN2/SA2)**

**- Capture agreements and provide CRs if agreeable, split work**

(E/// - moderator)

Summary of offline disc R3-223691

# For the Chairman’s Notes

**R3-223980 agreed** (E1AP CR - revision of R3-223951)

**R3-223996 agreed** (38.401 CR - revision of R3-223283)

# Discussion third round

## Revision of R3-223951 in R3-223980 along online discussions

Basically the gNB-CU-CP may request the following actions from the gNB-CU-UP:

1. apply the configuration of an available, appropriate Shared NG-U-Termination
2. apply the configuration requested by the gNB-CU-CP
3. reject if the “available” configuration is different from the “requested” one

The CU-UP provides the “available” configuration to the CU-CP, if appropriate (see draft revision of the E1 CR)

Any comments to the proposed E1 CRs

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| Company | Comment |
| Ericsson | we did our best |
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## Further discussions on data forwarding between supporting gNB and non-supporting target node

Please provide your comments on how RAN3 should proceed on that matter.

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| Company | Comment |
| Ericsson | we provided our view that for Rel-17 the discussion should not proceed.  apart from that, we are of the opinion, like detailed in the first round, that the proposed way forward is not appropriate as the handling of end-markers does not follow several aspects of how end-markers are generated and handled up to now and that it would require interactions among network/protocol entities for which a general solution is unrealistic or unnecessarily complex. |
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## stage 2 update (38.401) via a revision of R3-223283 in R3-223996, as uploaded

Please provide your comments, if any, on the proposal.

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# Discussion second round

## Revision of R3-223456/3383 to combine content on “consent”

This follows discussions at the online session

Proposed to enable all 3 proposed approaches on E1:

1. Network implementation/configuration, i.e. Remove current possibilities available on E1AP (no specification work needed)
2. CU-CP provides its consent to any "available shared up mbs qos flow mapping" (requires removal of ens)
3. CU-CP is enabled to request any already existing "available share up mbs qos flow mapping" at setup and modification and subsequently adopt to it in an additional step. (working on relevant changes as in R3-223456, needs additions e.g. In setup response to include the queried mapping/sdap/pdcp configuration)

Work on E1AP changes as a mix of r3-223456 and r3-223383 in a separate (new) paper

A draft CR is provided in the “second round” subfolder, please provide your comments, if any

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| Company | Comment |
| Ericsson | we did our best |
| Nokia | OK for the update, but I assume that the remaining FFS would also need to be removed. Please see my additional update. |
| Samsung | I think “, without reserving respective resources” should be removed. First it is implementation. Second it may give confusion that the CU-UP shall not use the configured mapping. In some case, it is not true. e.g. if this is the first message received by the CU-UP, there is no available mapping and the configuration inside the message should be stored and be used. |
| Lenovo | OK, some editorial update is provided for the CR. |

# Discussion first round

## Whether to specify data forwarding from supporting to non-supporting gNB

This is related to R3-223604.

The moderator believes that actually proposes to not specify data forwarding down to all details in Rel-17. Those "details" especially encompass the specification of how to stop data forwarding.

Also the intention to provide clear statements to other TSGs/WGs, as outlined in the coversheet, if taken seriously, would need clarifications on statements regarding switch from MRB and DRB before HO.

The moderator suggests the following approach:

<<<<<<<<<<<<<<<<<<<< Begin of Changes >>>>>>>>>>>>>>>>>>>>

##### 16.10.5.3.3 Handover between Multicast supporting cell and Multicast non-supporting cell

During an active multicast MBS session, at mobility from an MBS-supporting NG-RAN node to an MBS non-supporting NG-RAN node, the target NG-RAN node sets up PDU Session Resources mapped to the multicast MBS Session. The 5GC infers from the absence of an "MBS-support" indication in the Path Switch Request message (Xn handover) or Handover Request Acknowledge message (NG handover) that MBS data packets delivery has to be switched to 5GC individual MBS traffic delivery as specified in TS 23.247 [45]. If data forwarding is applied, the source NG-RAN changes the QFI(s) in the forwarded packets to the associated unicast QFI(s) if respective mapping information is available.

NOTE 1: Further details for data forwarding are not specified and left to implementation.

NOTE 2: The source NG-RAN node may be aware that the target NG-RAN node is non-MBS supporting already before Handover Preparation.

<<<<<<<<<<<<<<<<<<<< Unmodified Text Omitted >>>>>>>>>>>>>>>>>>>>

NOTE 3: Mobility from a multicast supporting cell to a multicast non-supporting cell may be performed by switching the MRB configuration to a DRB configuration in the source gNB before handover. Details are left to implementation.

NOTE 4: A UE may be handed over to a target gNB not-supporting MBS without prior reconfiguration from MRB to the DRB in the source gNB. In this case, the AS configuration may not be comprehended by the target gNB causing full configuration.

<<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

Please provide your view whether and why you would prefer or not prefer such approach.

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| Company | Comment |
| Ericsson | The moderator did his best to modify the existing text to accommodate the intention of the author of R3-223604. The moderator is also aware of the interrelation of NOTE 1 to the next topic. |
| Nokia | NOK. We think the data forwarding from supporting to non-supporting cannot be left to implementation. This is because the target gNB is a legacy node which expects an end marker packet generated at the right time i.e. avoiding that UE receives duplicate packets. This requires UPF to generate end markers as per proposal in R3-223452. This is due to the fact that the source gNB receives packets over shared N3, and this is independent on whether the MRB is switched to DRB before the handover or not. |
| ZTE | Fine with moderator's update, it is a precise reflection of RAN2 and RAN3 agreements:  - RAN3 115-e : "Stop discussions on supporting to non-supporting in R17."  - RAN2 117-e: "No further optimizations are pursued for neither solution 1 nor 2 in Rel-17, i.e. it is up to network and/or UE implementation how to minimize/avoid data loss during handover to non-MBS supporting node with either solution 1 or 2, as agreed in the last meeting."  and RAN2#116bis-e meeting:  RAN2 assumes for MRB to DRB switch to avoid full configuration during loss-less HO from MBS supporting node to Non-MBS supporting node and inform RAN3 accordingly.  oSolution 1 is assumed feasible (from procedure point of view): While the UE is still in source cell, source cell can reconfigure UE from MRB to DRB just before HO is initiated.  oSolution 2, FFS whether the reconfiguration can be done on the fly: Perform the switch from MRB to DRB during handover to support loss-less HO without full configuration. |
| Huawei | Not ok. Do not see the need on these changes.  There is a misunderstanding by ZTE, note that the previous agreement on stop discussion was not about to remove the agreement already achieved before that. |
| LGE | Not OK if the scheme proposed in R3-223452 has no impact on other WGs. |
| CMCC | Not ok. Agree with Huawei’s comment. In previous meeting, we reach the conclusion that it is assumed that the source gNB is aware of the MBS support of the target gNB before the handover. It is appropriate to put the conclusion in the main body instead of in the note. |
| Samsung | It is better to keep the agreement achieved before. This is the last meeting. |
| Lenovo | Same view with Nokia and Huawei. |

## End marker handling for mobility from supporting to non-supporting RAN node

This is related to R3-223452.

The draft CR in [x1] foresees a scheme where the end-marker that should stop forwarding of MBS data is provided outside the tunnels that deliver/forward the MBS data. Part of it is the assumption that SN/QFI information received within the end-marker at the (supporting source gNB's) UP entity serving the associated PDU Session tunnel is communicated to the (supporting source gNB's) UP entity serving the MBS session tunnel.

Please provide your view whether and why you would prefer or not prefer such approach.

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| Company | Comment |
| Ericsson | The moderator's company would like to keep the 2 principles: 1) end-markers to indicate the end of a data stream are delivered within the tunnel where the data stream is provided. 2) interaction between 2 different UP entities in the gNB are not assumed and not specified.  The proposal does not seem to follow those principles. |
| Nokia | Proposal in 3452 is OK and needed.  We think the data forwardin implementation. This is because the target gNB is a legacy node which expects an end marker packet generated at the right time i.e. avoiding that UE receives duplicate packets. This requires UPF to generate end markers as per proposal in R3-223452. This is due to the fact that the source gNB receives packets over shared N3, and this is independent on whether the MRB is switched to DRB before the handover or not. Please note that the issue mentioned by Ericsson does not exist if the UP entities are the same (implementation choice). |
| ZTE | We also share the similar view with moderator.  - RAN2 had agreed that "No further optimizations are pursued for neither solution 1 nor 2 in Rel-17, i.e. it is up to network and/or UE implementation how to minimize/avoid data loss during handover to non-MBS supporting node with either solution 1 or 2, as agreed in the last meeting."  - End marker per UE PDU session tunnel will result in extra signaling in 5GC. |
| Huawei | We support the proposal from Nokia, having the end marker can help the RAN node to avoid transmitting extra data packets over the radio. |
| LGE | We support Nokia’s proposal if the scheme proposed in R3-223452 has no impact on other WGs. |
| CMCC | Share the same view with Nokia and Huawei. In our view, the additional use case for transmitting end marker from MBS-supporting node to non-MBS supporting node should not be ignored. The target node will know the sequence number of the first packet that it will receive. The introduction end maker avoids the duplication reception in target node. In our view, the sequence number is carried in legacy end marker without introducing extra signaling. |
| Samsung | Same view with Nokia and Huawei. |
| Lenovo | Same view with Nokia and Huawei. |

## Indication of MC MBS Session Status in XnAP and NGAP

### Check Common Understanding of the intended approach

The moderator would like to confirm with companies whether the following approach was intended for Xn/NG based mobility:

1. independent of the MBS Session state, the MBS Session IDs and, if inhomogeneous MBMS deployment needs to be supported, Associated QoS Information is provided to the target NG-RAN node.
2. Only if the MBS Session is active,   
   - on NG, the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE  
   - on Xn, the *UE Context Information* IE   
   carries MBS Session information, so that a supporting NG-RAN node can immediately allocate MBS Session resources if the UE is the first to enter the target NG-RAN node for that MBS Session.

Please provide your view whether and why you would confirm the outlined common understand or why not.

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| Company | Comment |
| Ericsson | The moderator believes that the above are the principles which were intended and agreed to be realized in TS work. This approach would follow the principle that session information is only provided on Xn/NG at HO if session resources are allocated at the source side. |
| Nokia | Partly agree.  The Area Session ID is needed in addition to MBS session ID for inactive MBS sessions. Besides, it is clearer to separate the information expected by target gNB for active session and the ones expected for inactive sessions as proposed in tdoc R3-223454 and R3-223455. |
| ZTE | We share the same view with Ericsson. |
| CATT | Both agree.  Any detail beyond this can be discussed in the Stage 3 CB. |
| Huawei | Partly agree.  In our view, for inactive MBS session, at least the MBS Session ID and the Area Session ID should be provided. |
| CMCC | No strong view. |
| Samsung | We agree the view with the moderator and CATT. This is the basic. |
| Lenovo | Partly agree. For inactive MBS session, the MBS session ID should also be provided. |

### Implications of the outlined "Common Understanding"

If the "common understanding" outlined in 3.3.1 can be confirmed, then there are two implications:

1. On both, Xn and NG, the information how to immediately allocate MBS Session Resources is not needed, if the MC MBS Session is deactivated. This is possible to be achieved on NG by not including the *MBS Session Information Source to Target List* IE within the Source *NG-RAN Node to Target NG-RAN Node Transparent Container*, on Xn, it seems that the mandatory presence of the *MBS QoS Flows to Add List* IE in the *MBS Session Information List* IE needs to be changed to optional.
2. The presence/absence of the information how to immediately allocate MBS Session Resources could serve as an indication on whether the session is active/deactivated. Nevertheless, there could be still a "status IE" included, if the moderator has overlooked a further reason why this is needed.

The moderator proposes

1. to change in XnAP the presence of the *MBS QoS Flows to Add List* IE in the *MBS Session Information List* IE needs to optional and
2. specify the presence/absence
   1. on NG, of the *MBS Session Information Source to Target List* IE within the Source *NG-RAN Node to Target NG-RAN Node Transparent Container*,
   2. on Xn, of the *MBS QoS Flows to Add List* IE in the *MBS Session Information List* IE

as an indication of the MC MBS Session Status (active/deactived).

1. to further discuss whether an explicit "session status IE" is necessary

Please provide your view whether and why you would support the outlined proposal or why not.

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| Company | Comment |
| Ericsson | We would see the principles outlined in the "common understanding" very well captured in points a) and b) and are open to discuss any additional reason why an explicit session status is necessary or maybe beneficial from a message processing perspective. |
| Nokia | From a cleanest protocol perspective, we would prefer the encoding proposed in R3-223454 and R3-223455. |
| ZTE | We share the similar view with Ericsson. |
| CATT | Bullet a) is covered by the Stage 3 CB. (We technically agree with thus bullet.)  We are neutral with bullet b) and c). They overlap with similar discussion in the Stage 3 CB as well. |
| Huawei | Fine for the proposals.  No strong view on which option/set of CRs to be used.  In our view, for inactive MBS session, at least the MBS Session ID and the Area Session ID should be provided. |
| CMCC | No strong view. OptionB and OptionC are both ok. |
| Samsung | Agree with CATT. |
| Lenovo | Agree with CATT. |

## E1: how to enable the gNB to adopt an "Available Shared UP MBS QoS flow mapping"

There are 3 different approaches outlined in the submitted papers:

1. network implementation/configuration, i.e. remove current possibilities available on E1AP
2. CU-CP provides its consent to any "available shared UP MBS QoS flow mapping"
3. CU-CP is enabled to request any already existing "available share UP MBS QoS flow mapping" at setup and modification and subsequently adopt to it in an additional step.

The moderator proposes to enable all 3 possibilities

The moderator would expect that the "network implementation" approach would not need any explicit specification work, while the other approaches would complement each other and should be allowed to exist concurrently.

Please provide your view whether and why you would agree on the moderator's proposal or why not.

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| Company | Comment |
| Ericsson | The moderator believes that above approach would represent a nice compromise reflecting the different approaches the various companies have in mind. We believe that approach 2 and 3 have their merit in being realized (3 seems to require more steps as 2, but should not be precluded). Approach 1, i.e. preconfiguration instead of signalling is always possible for any optional feature. |
| Nokia | OK to go in that direction but need to see the details. |
| ZTE | ok to progress with compromise, but 2 and 3 might result in ambiguity as  - option 3 requires UP to allocate a different resources that CP requests,  - option 2 just over writes the config CP requests.  prefer option 2 with less signaling overhead. |
| CATT | Generally OK |
| Huawei | Approach 1.   * **Sync in terms of QoS flow to MRB mapping among NG-RAN nodes is achieved by network implementation.**   based on this agreement, different gNB-CU-CPs will make same decision on QoS flow to MRB mapping, the agreed solution is network implementation. |
| LGE | Similar view as Nokia. |
| CMCC | Fine with the moderator’s proposal. |
| Samsung | Maybe option 2 changes the old principle that CU-CP decides the mapping. If there are two "available shared UP MBS QoS flow mapping", e.g. first two CU-CP doesn’t give its consent, then there will be two "available shared UP MBS QoS flow mapping". Will CU-UP select one? And is it possible that the MRB selected by the CU-UP has confliction with other MRBs for the UE?  Therefore, maybe option 3 is safer. |
| Lenovo | We would prefer to have option 1 but fine to have option 2&3 |

## Whether and how Rel-17 should support the possibility to modify both, RAN and CN side terminations of the shared NG-U bearer for BC and MC

R3-223379 proposes to discuss whether Rel-17 specifications should foresee the possibility to modify RAN and CN side terminations for both BC and MC.

Please provide your view and reasoning.

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| Company | Comment |
| Ericsson | As outlined in R3-223379 we believe that these possibilities are really missing and would appreciate them to be realized in Rel-17. |
| Nokia | Addressed in CB MBS#1. See our comment there:  For 1/ there is the scenario agreed in CT4 of MB UPF restart which is addressed in tdoc R3-223453 (proposal 2, add multicast address in session update).  For 2/ the NG-RAN node can send a Broadcast release required and provide in the broadcat release response the new TNL address. This is covered also in tdoc R3-223453 proposal 8 (based on SA2 Tdoc S2-2202143). |
| ZTE | The proposal seems not controversial. we are surely open to discuss about it without messing up existing spec version. |
| CATT | Agree |
| Huawei | Note that it is overlapped with CB MBS#1.  For 1, it is not clear whether there is requirement to enable CN to update the IP Multicast address for MC. Seems there are different understanding of CT4 progress among companies.  For 2, no strong view, currently the RAN node is able to modify the DL termination in BC session modification response. |
| CMCC | Overlapped with CB MBS#1.  For 1, the benefit of enabling the CN to modify the IP multicast address needs clarification.  For 2, we think that Nokia’s suggestion is acceptable. |
| Samsung | Same view with Huawei. |
| Lenovo | Overlapped with CB MBS#1. |

## Presence of the *Data Forwarding Response MRB List* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE

R3-223379 proposes to reconsider the presence of the *Data Forwarding Response MRB List* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE, which is currently set to "mandatory".

Please provide your view and reasoning.

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| Company | Comment |
| Ericsson | As outlined in our paper, we would regard the change of presence as a precaution for further protocol additions, where the data forwarding IE would not be the only IE to be included. |
| Nokia | OK |
| ZTE | OK |
| CATT | Technically agree, but covered by Bullet 7 in R3-223529.  One technical issue: In order for compatibility with indirect data forwarding, we believe this IE should be included in the N2-SM container rather than in the “Container” IE. |
| Huawei | ok |
| LGE | OK |
| CMCC | OK |
| Samsung | OK |
| Lenovo | OK |

## Addition of stage 2 text in TS 38.420

R3-223096 proposes to include stage 2 text into TS 38.420.

Please provide comments/support/etc on the proposal in R3-223096.

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| Company | Comment |
| Ericsson | we would be fine with the CR. |
| Nokia | OK if the change is added at the end of section 5. Nokia would then be happy to cosign this CR. |
| ZTE | OK. |
| CATT | Agree |
| Huawei | Note that it is overlapped with CB MBS#1.  OK if the number is change to 5.2.13 |
| LGE | OK |
| CMCC | OK |
| Samsung | OK |
| Lenovo | OK |

## Any other topic which the moderator unintentionally missed

Please add thing, the moderator has missed.

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# Conclusion, Recommendations [if needed]

If needed

# References

1. R3-223077 " MBS Session Status during Xn HO preparation (Huawei, CBN, China Unicom, Lenovo, Motorola Mobility)" CR TS 38.423
2. R3-223078 " MBS Session Status during NG HO preparation (Huawei, CBN, China Unicom, Lenovo, Motorola Mobility)" CR TS 38.413
3. R3-223096 "Alignment with rel-17 changes in XnAP (Qualcomm Incorporated)" CR TS 38.420
4. R3-223185 "Indication for inactive MBS session (NEC)" discussion
5. R3-223187 "MBS Session Status indication in NGAP interface (NEC)" CR TS 38.413
6. R3-223188 "MBS Session Status indication in Xn interface (NEC)" CR TS 38.423
7. R3-223282 "Discussion the editor’s notes related to consent (Samsung)" discussion
8. R3-223283 "Remove the editor’s notes related to consent information (Samsung)" CR TS 38.401
9. R3-223284 "Remove the editor’s notes related to consent information (Samsung)" CR TS 37.483
10. R3-223379 "Rel-17 MBS Corrections (Ericsson)" discussion
11. R3-223452 "Correction of MBS Data Forwarding (Nokia, Nokia Shanghai Bell, Huawei)", draft CR TS 38.300
12. R3-223456 "Correction of MBS Shared CU UP (Nokia, Nokia Shanghai Bell)" CR TS 37.483
13. R3-223604 "Correction on NR MBS mobility for 38300 (ZTE Corporation)", draft CR TS 38.300 Rel-17
14. R3-223627 "Consent information exchange between E1 interface (Huawei)" discussion
15. R3-223628 "Correction on the FFS consent information (Huawei)" CR TS 38.401
16. R3-223629 "Correction on the FFS consent information (Huawei)" CR TS 37.483
17. R3-223631"Open issues in NGAP and XnAP specs (Qualcomm Incorporated)" discussion
18. R3-223672 "Corrections to E1AP for NR MBS (ZTE)" CR TS 38.423