**3GPP T****SG-RAN WG2 Meeting #116-bis-e R2-220xxxx**

**E-meeting, 17 – 25 January 2022**

**Agenda item:** 8.1.1

**Source:** Huawei, HiSilicon

**Title:** Open issues list for NR MBS

**WID:** NR\_MBS-Core

**Document for:** Information

# 1 Introduction

This document aims at summarizing open issues that need to be addressed for MBS Work Item by RAN2, including points captured in the running CRs for RAN2 specifications.

**Colour coding used for the “Rapporteur’s suggestions on how to address” column:**

**1. Company input into Pre117-e-offline (i.e. no company tdocs)**

**2. Company tdocs invited.**

**3. CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting).**

**4. Other (e.g. duplication issue in different CRs).**

# 2 List of RRC open issues (as captured in the RRC running CR [1])

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| **Issue** | **Relevant section in TS 38.331** | **Rapporteur’s suggestions on how to address** |
| The definitions/acronyms of radio bearers related to MBS need to be agreed and aligned between TS 38.331 and TS 38.300. | Definitions and abbreviations in sections 3.1. and 3.2, but also terms are used throughout the document. | CR rapporteur handled issue. Align between the CR rapporteurs for the next update. |
| FFS what physical layer configuration parameters are included in the *mbs-SessionInfoList,* if any. | 5.x.3.3 and potentially other places in the CR. | CR rapporteur handled issue. Will be updated in the next RRC CR update based on RAN1 input and can be reviewed during CR review. |
| USD/SAI terms to be aligned with SA2 specifications, once updated. | 5.x.4.3 | CR rapporteur handled issue. Update based on SA2 further agreements/updates. |
| An ID (e.g. SAI) of MBS services is provided in SIB and USD, as LTE SC-PTM. The details of the ID is pending for the feedbacks of other WGs. | 6.3.1 (SIBx1 definition) | CR rapporteur handled issue. Update based on SA2 further agreements/updates. |
| The detailed ID and mapping is pending the feedbacks of other WGs. | 6.3.1 (mbs-SAI-InterFreqList field description) | CR rapporteur handled issue. Update based on SA2 further agreements/updates. |
| FFS whether “HARQFeedback” condition has to be removed (to be verified based on RAN1 conclusions on HARQ feedback configuration) | 6.3.x (DRX-Config-PTM) | CR rapporteur handled issue.Will be updated in the next RRC CR update based on RAN1 input and can be reviewed during CR review. |
| FFS whether to support optional short DRX or not | 6.3.x (DRX-Config-PTM) | Other. To be handled in MAC open issues. |
| FFS whether TMGI definition from LTE is reused. | 6.3.x (MBS-SessionInfoList) | CR rapporteur handled issue. Update based on SA2 further agreements/updates. |
| Multiplicity and type constraint definitions for MBS | 6.4 | Other. Check after RRC CR becomes stable. |
| The default value of sn-FieldLength for MCCH is FFS. | 9.1.1 | Company input into Pre117-e-offline (i.e. no company tdocs). Discuss based on company contributions. |
| The default values (other than for t-Reordering) need to be confirmed by RAN2. | 9.1.1 | Company input into Pre117-e-offline (i.e. no company tdocs). Discuss based on company contributions. |
| FFS whether RRC can enable/disable C-RNTI based PTM retransmission |  | Company input into Pre117-e-offline (i.e. no company tdocs). |
| FFS whether the UE for multicast can be configured with multiple MTCHs with the same LCID (to be scheduled using different G-RNTIs like broadcast) |  | Company input into Pre117-e-offline (i.e. no company tdocs). |
| MBS Interest Indication information is exchanged between source gNB and target gNB at handover (FFS SCG change if applicable). |  | Others. Handled by another open issue in RRC. |
| Editor’s note: FFS whether for UEs with special access IDs resume/establishment cause other than mt-Access should be used in reply to group paging. | 5.3.2 | Company input into Pre117-e-offline (i.e. no company tdocs). Discuss based on company contributions. |
| Editor’s note: FFS how to capture that the UEs that expect group notification ignore PEI (and just monitor paging as usual). | 5.3.2 | Company input into Pre117-e-offline (i.e. no company tdocs). Discuss based on company contributions. |
| ***pdcch-ConfigMTCH***  Provides parameters for acquiring the PDCCH for MTCH. The UE shall use parameters in *pdcch-ConfigMCCH* also for PDCCH of MTCH when this field is absent.  Editor’s note: Considering that searchSpaceMTCH is configured within PDCCH-ConfigCommon, it is FFS (pending further RAN1 input) whether this field is needed | 6.2.2 | CR rapporteur handled issue. Update based on RAN1 further agreements/updates. |
| ***pdsch-AggregationFactor***  Number of repetitions for data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent the UE applies the value 1. For MBS multicast, this field indicates the number of repetitions for multicast SPS PDSCH.  Editor’s Note: When the field is absent, whether the UE applies PDSCH aggregation factor of PDSCH-Config-Multicast, PDSCH-Config, or fixed as 1 will be FFS. | 6.3.2 | CR rapporteur handled issue. Update with an option aligned with other similar signaling. |
| ***pdsch-AggregationFactor***  Number of repetitions for SPS PDSCH (see TS 38.214 [19], clause 5.1.2.1). When the field is absent, the UE applies PDSCH aggregation factor of PDSCH-Config.  Editor’s note: For multicast SPS PDSCH, when the field is absent, whether the UE applies PDSCH aggregation factor of PDSCH-Config-Multicast, PDSCH-Config, or fixed as 1 is FFS (in RAN1) | 6.3.2 | Company input into Pre117-e-offline (i.e. no company tdocs). |
| ***Editor’s note: FFS whether “HARQFeedback” condition has to be removed (to be verified based on RAN1 conclusions on HARQ feedback configuration)*** | 6.3.2 | CR rapporteur handled issue. Update based on RAN1 agreements/updates. |
| maxFreqMBS-r17 INTEGER ::= FFS(5) -- Maximum number of carrier frequencies for which an  -- MBS capable UE may indicate an interest in  maxNrofDRX-ConfigPTM-r17 INTEGER ::= FFS -- Max number of DRX configuration for PTM provided in MBS broadcast in a cell  maxNrofDRX-ConfigPTM-1-r17 INTEGER ::= FFS -- Max number of DRX configuration for PTM provided in MBS broadcast in a cell minus 1  maxNrofMBS-ServiceListPerUE-r17 INTEGER ::= FFS(15) -- Maximum number of services which the UE can  -- include in the MBS interest indication  maxNrofMBS-Session-r17 INTEGER ::= FFS -- Maximum number of MBS sessions provided in MBS broadcast in a cell  maxNrofMRB-Broadcast-r17 INTEGER ::= FFS -- Maximum number of broadcast MRBs configured for one MBS broadcast service.  maxNrofPageGroup-r17 INTEGER ::= FFS -- Maximum number of paging groups in a paging message  maxNrofPDSCH-ConfigPTM-1-r17 INTEGER ::= FFS -- Maximum number of PDSCH configuration groups for PTM minus 1  maxG-RNTI-r17 INTEGER ::= FFS -- Maximum number of G-RNTI that can be configured for a UE.  maxG-RNTI-1-r17 INTEGER ::= FFS -- Maximum number of G-RNTI that can be configured for a UE minus 1.  maxG-CS-RNTI-r17 INTEGER ::= FFS -- Maximum number of G-CS-RNTI that can be configured for a UE.  maxG-CS-RNTI-1-r17 INTEGER ::= FFS -- Maximum number of G-CS-RNTI that can be configured for a UE minus 1.  maxMRB-r17 INTEGER ::= FFS -- Maximum number of multicast MRBs (that can be added in MRB-ToAddModLIst).  maxSAI-MBS-r17 INTEGER ::= FFS(64) -- Maximum number of MBS service area identities(FFS)  maxNeighCell-MBS-r17 INTEGER ::= FFS -- Maximum number of MBS broadcast neighbour cells | 6.4 | Company input into Pre117-e-offline (i.e. no company tdocs). |
| Editor’s note: FFS whether MBS Interest Indication is exchanged during SCG change. | 11.2.2 | Company input into Pre117-e-offline (i.e. no company tdocs). |

# 3 List of MAC open issues (as captured in MAC running CR [2])

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| **Issue** | **Relevant section in TS 38.321** | **Rapporteur’s suggestions on how to address** |
| The definitions/acronyms related to MBS need to be agreed and aligned between TS 38.331 and TS 38.300. | 3.1 | CR rapporteur handled issue. Align between the CR rapporteurs for the next update. |
| FFS to DL assignment and HARQ process related issue, wait for RAN1 to input more. | 5.3.1 | CR rapporteur handled issue. CR rapporteur to update based on RAN1 agreements and review during the next CR review. |
| FFS how to start the RTT timer when no feedback is transmitted in NACK only case. | 5.7b | Company input into Pre117-e-offline (i.e. no company tdocs). The question would be rephrased. |
| FFS to support DRX Command MAC CE for MBS DRX. | 5.7b | Company input into Pre117-e-offline (i.e. no company tdocs). The question would be rephrased. |
| FFS to support short DRX for MBS. | 5.7b | Company input into Pre117-e-offline (i.e. no company tdocs). |
| FFS to CSI and SRS reporting due to MBS DRX. | 5.7b | Company tdocs invited. |
| FFS to HARQ disable or HARQ is not configured case for MBS. | 5.7b | Company input into Pre117-e-offline (i.e. no company tdocs). The question would be rephrased. |
| FFS on SPS impact due to MBS. | 5.8.1 | CR rapporteur handled issue. CR rapporteur to remove the FFS and update based on RAN1 agreements if needed and review during the next CR review. |
| Editor’s note: FFS to PTP for PTM retransmission case. | 5.7b | CR rapporteur handled issue. CR rapporteur to provide a TP first based on existing agreement and future agreements. |
| Editor’s note: FFS how to associate the G-CS-RNTI and MBS SPS. | 5.8.1a | Company input into Pre117-e-offline (i.e. no company tdocs). The question will be rephrased. It seems not releveant in MAC. May discuss in RRC. |
| Whether there are MBS specific impacts on MAC reset procedure |  | Company input into Pre117-e-offline (i.e. no company tdocs). The question would be rephrased. |

# 4 List of 38.304 open issues (as captured in 38.304 running CR [3])

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| **Issue** | **Relevant section in TS 38.304** | **Rapporteur’s suggestions on how to address** |
| The term “MBS broadcast services” may be changed to align with other RAN2 specs later if needed. | 4.1 and others | Company input into Pre117-e-offline (i.e. no company tdocs). |
| SIBx is the MBS SIB carrying the MCCH configuration. The name of SIBx will be updated to align with other RAN2 specs later. | 5.2.4.1 | CR rapporteur handled issue. |
| SIBy is the SIB providing the mapping between frequency and IDs (e.g. SAI). The name of SIBy will be updated to align with other RAN2 specs later. | 5.2.4.1 | CR rapporteur handled issue |
| The term “USD” may be updated if needed based on SA4 conclusion. The details of the IDs (e.g. SAI) of MBS services in SIB and USD is pending for the feedbacks of other WGs. | 5.2.4.1 | CR rapporteur handled issue |

# 5 List of 38.300 open issues (as captured in 38.300 running CR [4])

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| **Issue** | **Relevant section in TS 38.300** | **Rapporteur’s suggestions on how to address** |
| The indices “x” and “x1” in *SIBx* and *SIBx1*, respectively, will be align with that in the stage-3 specification, i.e., TS 38.331. | 7.3.1 | CR rapporteur handled issue |
| An ID (e.g. SAI) of MBS services is provided in *SIBx1* and USD, as LTE SC-PTM. The details of the ID and the definition of USD are pending for the feedbacks of other WGs. | 7.3.1 | CR rapporteur handled issue |
| FFS whether multiple G-RNTIs/G-CS-RNTIs are supported depends on UE capability. | 16.x.4 | CR rapporteur handled issue. FFS can be removed based on agreements. |
| FFS how multicast configuration is provided for supporting multicast reception in RRC\_CONNECTED state. | 16.x.5.2 | CR rapporteur handled issue.. |
| How to avoid potential notification loss for UEs is gNB implementation dependant. | 16.x.5.2 | CR rapporteur handled issue. The editor’s note should be removed. |
| FFS whether same mechanisms as for PTP RLC-AM loss-less HO can be applicable in case of source cell with PTM only configuration and target cell supporting PTP only or PTM + PTP configurations. (FFS may come for free) | 16.x.5.3.1 | Company input into Pre117-e-offline (i.e. no company tdocs) |
| A procedure flow for mobility will be provided in the future. | 16.x.5.3.1 | CR rapporteur handled issue. A figure to be added once more progress is achieved (perhaps by RAN3) |
| Lossless mobility and data forwarding to be updated along the progress of respective discussions in RAN2 and RAN3. | 16.x.5.3.1 | CR rapporteur handled issue. CR rapporteur to update the CR based on RAN3 agreements. |
| FFS whether the switching the traffic from delivery via MRB to delivery via DRB either before or during the handover. | 16.x.5.3.2 | Other. The editor note would be addressed based on another open issue. |
| Whether and how this can be done without data losses has to be further investigated and requires progress and input from other WGs, i.e. RAN3 and SA2. | 16.x.5.3.2 | Other. The editor note would be addressed based on another open issue. |
| FFS that RAN1 inputs are needed for the definition of MBS control information on the MCCH acquisition, e.g. the definition of common search space for MCCH scheduling, and the details of the configuration of the bandwidth for MCCH reception. | 16.x.6.2 | CR rapporteur handled issue. CR rapporteur to update based on RAN1 conclusions and the changes can be reviewed during the next CR review. |
| FFS the detailed information, e.g. USD , SAI/TMGI etc. | 16.x.6.4 | CR rapporteur handled issue. Update based on SA2/SA4 further agreements/updates. |
| The details of the ID of MBS services is pending for the feedbacks of other WGs. | 16.x.6.4.1 | CR rapporteur handled issue. Update based on SA2/SA4 further agreements/updates. |
| The detailed mapping between frequency and MBS service ID is pending for the feedbacks of other WGs. | 16.x.6.4.1 | CR rapporteur handled issue. Update based on SA2/SA4 further agreements/updates. |
| FFS whether the MII is reported via UEAssistanceInformation or a new RRC message. |  | CR rapporteur handled issue. Editor note can be removed based on agreements. |

# 6 List of PDCP open issues (as captured in PDCP running CR [5])

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| **Issue** | **Relevant section in TS 38.323** | **Rapporteur’s suggestions on how to address** |
| The definitions/acronyms of radio bearers related to MBS need to be agreed and aligned amongst TS 38.331, 38.323 and TS 38.300. | 3.1 | CR rapporteur handled issue. Align between the CR rapporteurs for the next update. |
| FFS whether it is up to UE implementation to prevent COUNT wrap-around for broadcast, given that HFN is selected by the UE itself. |  | Company input into Pre117-e-offline (i.e. no company tdocs) |

# 7 List of UE capability open issues

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| **Issues** | **Source** | **Rapporteur’s suggestions on how to address** |
| ROHC:  1/ Whether ROHC should be supported for MBS Broadcast;  2/ if ROHC is supported, is it mandatory or optional for MBS broadcast?  3/ if ROHC is mandatory, which profiles should be supported, and what is the number of supported ROHC context? | Offline [AT116bis-e][026] | Company input into Pre117-e-offline (i.e. no company tdocs) |
| Based on the incoming RAN1 LS, RAN2 to discuss whether MBS broadcast reception on SCell and MBS broadcast reception on non-serving cell should be optional UE capabilities. |  | Company input into Pre117-e-offline (i.e. no company tdocs) |

# 7 Other open issues (not captured in the running CRs)

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| **Issue** | **Source** | **Rapporteur’s suggestions on how to address** |
|  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.  Solution 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.  Solution 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.   FFS whether to support optimization for either solution 1 or solution 2 or No optimization support to avoid full configuration during Multicast loss-less HO from MBS node to Non-MBS supporting node. |  | Company input into Pre117-e-offline (i.e. no company tdocs). |
| It is up to network implementation on how to configure DL RTT and Re-transmission timer of multicast DRX in case of multicast HARQ ACK/NACK feedback using UE specific PUCCH resources. FFS for case of disabled HARQ FB.  For group common PTM Multicast HARQ PUCCH resources (NACK only feedback), the same group of UEs have aligned HRAQ RTT and DL Re-Tx timer configuration. HARQ RTT timer counting starts from end of common PUCCH resource based NACK transmission (i.e. same as Unicast DRX behaviour). FFS for case of disabled HARQ FB. | Chairman notes | Other.  Related to the FFS in the MAC running CR:  FFS to HARQ disable or HARQ is not configured case for MBS.  FFS how to start the RTT timer when no feedback is transmitted in NACK only case. |
| FFS For DRX command MAC CE for multicast DRX, the following alternatives are on the table (one to be selected):   * Option 2b: introduce a new DRX command MAC CE per multicast DRX operation (i.e. per G-RNTI basis) * Option 3: neither legacy DRX command MAC CE nor new DRX command MAC CE is used for multicast DRX, i.e. no DRX command MAC CE for multicast DRX. | Chairman notes | Other.  Related to the FFS in the MAC running CR:  FFS to support DRX Command MAC CE for MBS DRX. |
| FFS whether dedicated broadcast HARQ processes are used for MCCH and MTCH? |  | Company input into Pre117-e-offline (i.e. no company tdocs) |
| Based on the incoming RAN1 LS, RAN2 to discuss whether to support MBS broadcast reception on SCell and supporting MBS broadcast reception on non-serving cell. |  | Company input into Pre117-e-offline (i.e. no company tdocs) |
| Whether the existing MII is sufficient to indicate the UE is interested in broadcast on SCell (or non-serving cell) , for the network to do configuration. |  | Company input into Pre117-e-offline (i.e. no company tdocs) |

# References

1. R2-2111658, *38.331 running CR for NR MBS*, Huawei, HiSilicon
2. R2-2111414, *38.321 running CR for NR MBS*, OPPO
3. R2-2111441, *38.304 running CR for NR MBS*, CATT
4. R2-2111605, *38.300 Running CR for MBS in NR*, CMCC, Huawei
5. R2-2111666, *38.323 running CR for NR MBS*, Xiaomi Communications