**3GPP TSG RAN meeting #101 RP-23xxxx**

**Bangalore, India, September 11-15, 2023**

## Status Report to TSG

**Agenda item:** 9.3.2.8

|  |  |
| --- | --- |
| **WI / SI Name** | Enhancements of NR Multicast and Broadcast Services |
| included in this status report | Study Item: No | Core part: Yes | Performance part:No | Testing part:No |
| **Acronym** | NR\_MBS\_enh |
| **Unique ID** | 940099 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-221458 |
| **Target Completion Date****(indicate if changed)** | Study Item:  | Core part: 12/2023 | Performance part:  | Testing part:  |
| **Overall Completion level** | Study Item:  | Core part: 75% | Performance Part:  | Testing part:  |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN2 |
| **Rapporteur** | **Name** | Erlin Zeng |
| **Company** | CATT |
| **Email** | erlin.zeng@catt.cn |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

#### 2.1.2 Remaining Open issues

## 2.2 RAN2

#### 2.2.1 Agreements in RAN2#123

**Multicast reception in RRC\_INACTIVE**

For a UE receiving multicast in RRC\_INACTIVE, the UE resumes the RRC connection when the measured RSRP or RSRQ based on the existing measurement requirements (whichever is configured by the NW) of the serving cell becomes lower than the threshold configured by network. FFS whether/how we need to address ping-pong issue

The threshold can be configured in PTM configuration per MBS session via RRCRelease or multicast MCCH message.

Unless issues are identified with using one of existing resume causes, no new resume causes are introduced for UEs receiving MC in INACTIVE when they resume due to bad quality or lack of SIBx/PTM configuration

Dedicated frequencies in RRCRelease can be used by the NW, as legacy

FFS whether we need something more, e.g. frequency priorities in MCCH or a solution based on FSAI

NW indicates which multicast service can be received in INACTIVE in suspendConfig of RRC Release. FFS how exactly this is indicated

Unless blocking issues are identified, UE behaviour is not to suspend corresponding multicast MRBs and to keep using them in INACTIVE

For “non-synchronised“ cell (in terms of PDCP COUNT), upon cell reselection, UE sets the initial PDCP count of the MRB for the multicast reception in RRC\_INACTIVE state based on the same mechanism as R17 MBS broadcast.

One cell can indicate "synchronized", if by implementation, it follows a common QoS flow to MRB mapping rule and at the same time PDCP COUNT is set according to the MBS QoS Flow SN.

FFS how the UE is indicated about cells being synchronized (i.e. what information the NW needs to provide to the UE)

Solutions which require COUNT broadcasting via MCCH are not considered

SPS is not supported for multicast reception in RRC\_INACTIVE.

RAN2 enables RRC\_INACTIVE UE receiving multicast to also receive possible PTM retransmissions initiated by UEs receiving multicast in RRC\_CONNECTED.

Allow configuration of drx-HARQ-RTT-TimerDL-PTM and drx-RetransmissionTimerDL-PTM for INACTIVE UEs (38.331).

UE receiving MBS multicast in RRC\_INACTIVE should start drx-HARQ-RTT-TimerDL-PTM and drx-RetransmissionTimerDL-PTM when reception of the transport block has not been successful. FFS the details, e.g. when the timers are started exactly.

This is optional UE capability

**Shared processing for MBS broadcast and Unicast reception**

As per the previous agreement, if the UE is able to get the additional information (i.e. its current configuration does not prevent it from doing so), the UE shall do this (if capable and configured by the network)

In case additional information (SCS, bandwidth) is not available at the time of sending the MII to the unicast serving cell (e.g. the UE is not able to read SIB1 from the non-serving cell), the UE reports whatever is available information at that time (i.e. at least the frequency, and optionally SCS and/or BW as available).

UE reports updated MII after acquiring additional information from the non-serving cell (if previously it reported only frequency) or if the information in the non-serving cell changes.

The SCS in the MII is set to the SCS of the CORESET#0 for the MBS broadcast cell.

Combination of FreqBandIndicatorNR and ARFCN-ValueNR is used to signal the frequency information in the MII for shared processing.

At least CFR bandwidth is reported by the UE in MII. FFS whether “location” needs to be also reported and how exactly this is captured in RRC (i.e. which IE is used).

#### 2.2.2 Remaining Open issues

* Specify support of multicast reception by UEs in RRC\_INACTIVE state [RAN2, RAN3]
	+ PTM configuration for UEs receiving multicast in RRC\_INACTIVE state
	+ Study the impact of mobility and state transition for UEs receiving multicast in RRC\_INACTIVE. (Seamless/lossless mobility is not required)
* Specify Uu signalling enhancements to allow a UE to use shared processing for MBS broadcast and unicast reception, i.e., ‎including UE capability and related assistance information reporting regarding simultaneous unicast reception in RRC\_CONNECTED and MBS broadcast reception from the same or different operators [RAN2]

## 2.3 RAN3

#### 2.3.1 Agreements in RAN3#121

**About RAN Sharing**

NG functions

* Introduce Broadcast session transport request/response/failure procedure to support NG-RAN triggered NG-U tunnel establishment.
* CU-CP makes decision on whether to establish NG-U tunnel.

F1 functions

* For MOCN scenario, only one set of shared F1-U tunnels is established and kept for MOCN scenario as long as there is one PLMN keeping the MBS service.
* For multiple cell-ID broadcast scenario, the entity controlling logical DUs decides how many F1-U tunnels to be set up. The decision of CU-CP on establishment of NG-U tunnel takes the feedback of DU on establishment of a set of F1-U tunnels into account.
* Adopt the option of Multiple F1AP contexts/messages, one per PLMN, for MOCN scenario.

E1 functions

* Associated session ID and MBS service area should be introduced in E1AP for shared NG-U termination scenario (regardless of whether we have one or multiple broadcast bearer context on E1 for RAN sharing).
* Multiple E1AP context/message, one per PLMN, for MOCN scenario.

**Multicast reception in RRC\_INACTIVE**

* Introduce Multicast CU to DU RRC Information IE in F1AP Multicast Context Setup/Modification Request message.
* Include PDCP configuration and (multicast specific) mtch-neighbourCell in Multicast CU to DU RRC Information IE.
* Enable providing the (multicast specific) MBS Neighbour cell list in F1AP to the DU.
* CU/CU-CP makes the final decision on whether to enable/disable “Inactive reception” mode for specific multicast session.
* An indication should be introduced in F1AP Group Paging message to inform DU that inactive reception is allowed for this MBS session and thereby DU could notify UE via Uu Group Paging message.

#### 2.3.2 Remaining Open issues

* Specify support of multicast reception by UEs in RRC\_INACTIVE state [RAN2, RAN3]
	+ Study the impact of mobility and state transition for UEs receiving multicast in RRC\_INACTIVE. (Seamless/lossless mobility is not required) [RAN2, RAN3]
* Study and if necessary, specify enhancements to improve the resource efficiency for MBS reception in RAN sharing scenarios[RAN3]

## 2.4 RAN4

#### 2.4.1 Agreements

#### 2.4.2 Remaining Open issues

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

1. R2-2307015 Reply LS on multicast reception in RRC\_INACTIVE (R1-2306243; contact: Apple) RAN1 LS in Rel-18 NR\_MBS\_enh-Core To:RAN2
2. R2-2307112 Initial Consideration on UE Capability of eMBS vivo
3. R2-2307492 RRC running CR for eMBS Huawei, HiSilicon
4. R2-2307084 Control plane for multicast reception in RRC\_INACTIVE state TD Tech, Chengdu TD Tech
5. R2-2307085 MCCH change notification for multicast sessions in RRC\_INACTIVE state TD Tech, Chengdu TD Tech
6. R2-2307109 Discussion on eMBS from the CP Perspective vivo
7. R2-2307135 Control plane discussion for multicast reception in RRC INACTIVE MediaTek inc.
8. R2-2307155 Discussion on security issue with multicast MCCH CANON Research Centre France
9. R2-2307263 Discussion on Control Plane for Multicast Reception in RRC\_INACTIVE CATT, CBN discussion
10. R2-2307412 Consideration on the control plane issue for multicast reception in RRC\_INACTIVE Beijing Xiaomi Software Tech
11. R2-2307459 Discussion on control plane for Multicast reception in RRC\_INACTIVE NEC Corporation
12. R2-2307493 CP issues for multicast reception for RRC INACTIVE UE Huawei, HiSilicon
13. R2-2307594 CP aspects for Multicast reception in RRC\_INACTIVE Samsung R&D Institute India
14. R2-2307638 Service continuity, RRC state transitions and notifications Qualcomm Incorporated
15. R2-2307768 Control plane details for multicast reception in RRC\_INACTIVE state Nokia, Nokia Shanghai Bell
16. R2-2307779 RRC Resume for Multicast in RRC\_INACTIVE SHARP Corporation discussion
17. R2-2307843 Control plane aspects for multicast reception in RRC INACTIVE Apple
18. R2-2307895 Discussion on SDT and MBS multicast reception in RRC\_INACTIVE ITRI
19. R2-2308013 Control plane aspects of Multicast reception in RRC\_INACTIVE Lenovo
20. R2-2308109 Control plane aspects on multicast reception in RRC INACTIVE Kyocera
21. R2-2308133 Discussion on Service Continuity and RRC state transitions Spreadtrum
22. R2-2308200 PTM configuration and session deactivation LG Electronics Inc.
23. R2-2308201 Multicast servic continuity LG Electronics Inc.
24. R2-2308304 Discussion on multicast reception in RRC\_INACTIVE CP issues CMCC
25. R2-2308343 Multicast reception in RRC\_INACTIVE ZTE, Sanechip
26. R2-2308552 MBS multicast and UE power saving Ericsson
27. R2-2308558 Connection resumption triggering for more reliable MBS reception InterDigital Inc.
28. R2-2308649 MCCH Monitoring and Configuration of UE with Multicast reception in RRC\_INACTIVE SHARP
29. R2-2308652 Support of SDT and Multicast in RRC\_INACTIVE configured together SHARP
30. R2-2308850 PTM configuration for eMBS Shanghai Jiao Tong University, NERCDTV
31. R2-2308889 Multicast reception in RRC\_INACTIVE Ericsson
32. R2-2307110 Discussion on eMBS from the UP Perspective vivo
33. R2-2307136 L2 operation during state transitions and mobility for R18 multicast MediaTek inc.
34. R2-2307146 User plane aspects for eMBS NEC
35. R2-2307148 User plane for multicast reception in RRC\_INCTIVE state TD Tech, Chengdu TD Tech
36. R2-2307264 Discussion on User Plane for Multicast reception in RRC\_INACTIVE CATT, CBN
37. R2-2307494 UP issues for multicast reception for RRC INACTIVE UE Huawei, HiSilicon
38. R2-2307639 Further views on multicast CFR configuration aspects Qualcomm Incorporated
39. R2-2307758 UP Aspects for Multicast Reception in RRC\_INACTIVE Samsung
40. R2-2307844 User plane aspects for multicast reception in RRC\_INACTIVE Apple
41. R2-2307984 User plane aspects of multicast reception in RRC\_INACTIVE state Nokia, Nokia Shanghai Bell
42. R2-2308014 User plane aspects of Multicast reception in RRC\_INACTIVE Lenovo
43. R2-2308305 Discussion on multicast reception in RRC\_INACTIVE UP issues CMCC
44. R2-2308344 CFR design for Multicast reception in RRC\_INACTIVE ZTE, Sanechips
45. R2-2308535 MBS remaining issues on DRX Ericsson
46. R2-2308594 Discussion on UP issues for Multicast in RRC Inactive LG Electronics Inc.
47. R2-2308853 Discussion and draft TP on the PDCP operation for the support of multicast reception in RRC\_INACTIVE state Beijing Xiaomi Software Tech
48. R2-2307111 Further Discussion on Shared Processing in eMBS vivo
49. R2-2307265 Remaining Issues on Shared Processing CATT, CBN
50. R2-2307460 Discussion on shared process for MBS broadcast and unicast NEC Corporation
51. R2-2307495 Discussion on shared processing for MBS broadcast and unicast reception Huawei, HiSilicon
52. R2-2307596 Rel-18 MII Enhancements Samsung R&D Institute India
53. R2-2307640 Shared processing for MBS broadcast and Unicast reception Qualcomm Incorporated
54. R2-2307675 Discussion on the reporting signaling for shared MBS capability Xiaomi
55. R2-2308306 Discussion on shared processing CMCC
56. R2-2308345 Non-serving cell configuration update in case of shared processing ZTE, Sanechips
57. R2-2308744 Additional scenarios for shared processing Nokia, Nokia Shanghai Bell discussion
58. R2-2308957 MAC running CR for eMBS Apple
59. R2-2309032 [Offline 601] Discussion report: Frequency and bandwidth signalling Qualcomm Incorporated
60. R3-234765 (TP for BL CR for 38.401) Update of MBS RAN sharing solution  CATT, ZTE, Huawei, Nokia, Nokia shanghai Bell, Ericsson, Qualcomm, CMCC, CBN, Samsung
61. R3-234767 (TP for BLCR for 38.473) Update of MBS RRC\_INACTIVE reception Ericsson, Huawei, Samsung, Nokia, Nokia Shanghai Bell, CATT, ZTE, Qualcomm, CMCC
62. R3-234704 (TP for BLCR for 38.401) Update of MBS RRC\_INACTIVE reception CMCC, Huawei, CATT, ZTE, Ericsson, Nokia, Nokia shanghai Bell, Qualcomm, Samsung
63. R3-234766 (TP for BL CR for 38.483) Update of MBS RAN sharing solution  Nokia, Nokia Shanghai Bell, Qualcomm Inc., CATT, Huawei, ZTE, Ericsson, CMCC, Samsung
64. R3-234697 (TP for BL CR for 38.300) Update of MBS RAN sharing solution ZTE
65. R3-234699 (TP for BL CR for 38.410) Update of MBS RAN sharing solution  Qualcomm
66. R3-234700 (TP for BL CR for 38.413) Update of MBS RAN sharing solution Huawei, Nokia, Nokia Shanghai Bell, CATT, ZTE, Ericsson, Samsung, Qualcomm Incorporated
67. R3-234636 Support of MBS enhancement CATT, Nokia, Nokia Shanghai Bell, ZTE, Qualcomm, Huawei, CATT, Samsung
68. R3-234635 Support of MBS enhancement Ericsson, Nokia, Nokia Shanghai Bell, ZTE, Qualcomm, Huawei, CATT, Samsung
69. R3-234637 (BLCR to 38.473) Support of MBS enhancement Samsung, Nokia, Nokia Shanghai Bell, ZTE, Qualcomm, Huawei, CATT, Samsung
70. R3-234638 (BL CR to TS 38.470) Introduction of NR MBS enhancements Lenovo, Huawei, Nokia, Nokia Shanghai Bell
71. R3-234639 (BL CR to TS 38.300) Introduction of NR MBS enhancements Nokia, Nokia Shanghai Bell, Huawei, ZTE, Ericsson, Lenovo
72. R3-234640 (BLCR to 38.401) Introduction of NR MBS enhancements Huawei, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Ericsson, Lenovo, ZTE, CATT, Samsung
73. R3-233749 Support of MBS enhancement CATT, Nokia, Nokia Shanghai Bell
74. R3-234246 Discussion on Multicast over Inactive CATT,CBN
75. R3-234247 Discussion on efficient MBS reception in RAN sharing scenario CATT,CMCC,CBN
76. R3-234615 Summary of unofficial offline Discussion on Rel-18 MBS CATT
77. R3-234698 (TP for BL CR for 38.401) Update of MBS RAN sharing solution  CATT
78. R3-234773 (\*cancelled allocation) CATT, ZTE, Huawei, Nokia, Nokia shanghai Bell, Ericsson, Qualcomm, CMCC, CBN, Samsung
79. R3-233741 Support of MBS enhancement Ericsson, Nokia, Nokia Shanghai Bell
80. R3-234703 (TP for BLCR for 38.473) Update of MBS RRC\_INACTIVE reception Ericsson, Huawei, Samsung, Nokia, Nokia Shanghai Bell, CATT, ZTE, Qualcomm, CMCC
81. R3-233765 (BLCR to 38.473) Support of MBS enhancement Samsung, Nokia, Nokia Shanghai Bell
82. R3-234701 (TP for BL CR for 38.473) Update of MBS RAN sharing solution  Samsung
83. R3-234450 Multicast Reception in RRC\_INACTIVE state CMCC
84. R3-233803 (BLCR to 38.470) Multicast Reception for RRC\_INACTIVE state UEs Lenovo, Huawei, Nokia, Nokia Shanghai Bell
85. R3-234183 Discussion on multicast reception in RRC\_INACTIVE Lenovo
86. R3-234184 Remaining issues of supporting MBS reception in RAN Sharing Lenovo
87. R3-234233 Further thoughts on MBS reception for RAN sharing scenarios Ericsson
88. R3-234234 Further thoughts on support for RRC\_INACTIVE Ericsson
89. R3-233782 (BL CR to TS 38.300) Introduction of NR MBS enhancements Nokia, Nokia Shanghai Bell, Huawei, ZTE, Ericsson, Lenovo
90. R3-233852 (TP for TS 38.470, 37.483, 38.473) Resolution of RAN sharing open points Nokia, Nokia Shanghai Bell
91. R3-233853 (TP for TS 38.300, TS 38.423) Resolution of open points for Reception in RRC Inactive State Nokia, Nokia Shanghai Bell
92. R3-234702 (TP for BL CR for 38.483) Update of MBS RAN sharing solution  Nokia, Nokia Shanghai Bell
93. R3-234211 (TP to TS 38.413, 38.473) Network sharing for MBS Broadcast ZTE
94. R3-234212 (TP to TS 38.413, 38.473) Multicast reception in RRC\_INACTIVE ZTE
95. R3-233978 Stage-2 CR for Introducing MBS RAN Sharing for OAM based solution. Qualcomm Incorporated, Huawei, Nokia, Nokia Shanghai Bell
96. R3-233979 Support of MBS in RAN sharing scenarios Qualcomm Incorporated
97. R3-233980 Enhancements to support Multicast reception by UEs in RRC\_INACTIVE state Qualcomm Incorporated
98. R3-233791 (BLCR to 38.401) Introduction of NR MBS enhancements Huawei, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Ericsson, Lenovo
99. R3-234089 (TPs to MBS BL CRs) MBS reception in RAN sharing scenario Huawei, CBN
100. R3-234090 (TPs to MBS BL CRs) Multicast Reception for RRC\_INACTIVE state UEs Huawei, CBN
101. R3-233948 (TP for BLCR TS37.483) Discussion on MBS RAN sharing Samsung
102. R3-233949 (TP for BLCR TS38.473) Discussion on MBS reception by inactive state UE Samsung

 17.05.2021 minor adaptations for RAN #92e

 28.01.2021 minor adaptations for RAN #91e

 09.11.2020 minor adaptations for RAN #90e

 31.08.2020 minor adaptations for RAN #89e

 20.04.2020 minor adaptations for RAN #88e

 18.02.2020 minor adaptations for RAN #87e

 14.11.2019 minor adaptations for RAN #86

 18.08.2019 minor adaptations for RAN #85

 12.05.2019 minor adaptations for RAN #84

 27.02.2019 minor adaptations for RAN #83

 21.11.2018 completion levels with colours added (for RAN #82)

v04.81 31.07.2018 simplification of template and addition of cross-TSG aspects (for RAN #81)

v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

v04.75 31.01.2017 minor adaptations for RAN #75

v04.74 28.10.2016 minor adaptations for RAN #74

v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

v04.70 30.10.2015 minor adaptations for RAN #70

v04.69 12.08.2015 minor adaptations for RAN #69

v04.68 21.05.2015 minor adaptations for RAN #68

v04.67 01.02.2015 minor adaptations for RAN #67

v04.66 16.11.2014 minor adaptations for RAN #66

v04.65 16.08.2014 minor adaptations for RAN #65

v04.64 22.05.2014 minor adaptations for RAN #64

v04.63 24.01.2014 restructuring for RAN #63 to cover Core & Perf. in one doc file

v03.62 11.11.2013 section 1.2.3 adapted for RAN #62

v03 11.08.2013 section 1.2.3 added on time budget

v02 07.05.2010 history added, some spelling corrections

v01 13.11.2009 First version of the template