

R3-225995

Variant of CB: # MBS1_Workplan_SA2LS_RAN3_117bis-e Version 0.0.4

RAN3

<https://nwm-trial.etsi.org/#/documents/8230>

3GPP TSG-RAN WG3 Meeting #117bis-e R3-225995

E-meeting, 10 – 18 October 2022

Title: Summary of Offline Discussion on MBS1_Workplan_SA2LS

Source: Huawei (Moderator)

Agenda item: 15.1

Document Type: Discussion

1 Introduction

CB: # MBS1_Workplan_SA2LS

- Check work plan, revise R3-225761 if needed
- Check the incoming LS from SA2, provide reply on the questions

(HW - moderator)

[NWM] Summary of offline disc R3-225920

2 For the Chairman's Notes

Endorse the BL CR assignment.

- TS 38.300, Nokia
- TS 38.401, Huawei, Qualcomm
- TS 38.413, CATT
- TS 38.410, Qualcomm, Huawei
- TS 38.423, Ericsson
- TS 38.420, CMCC
- TS 38.473, Samsung
- TS 38.470, Lenovo

- TS 37.483, ZTE
- TS 37.480, NEC

Agree the Reply LS in R3-225987 revised from R3-225661.

3 Round2_Discussion

Update Draft R3-225987 revised from R3-225661, the Draft Reply LS.

4 Round1_Discussion

4.1 BL CR assignment

In R3-225761, it is proposed to capture the BL CR assignment in the chairman notes as follows:

- TS 38.300, Nokia
- TS 38.401, Huawei, Qualcomm
- TS 38.413, CATT
- TS 38.410, Qualcomm, Huawei
- TS 38.423, Ericsson
- TS 38.420, CMCC
- TS 38.473, Samsung
- TS 38.470, Lenovo
- TS 37.483, ZTE
- TS 37.480, NEC

Feedback Form 1: Any comment on the BL CR assignment?

1 – Nokia France OK
2 – CATT OK
3 – Samsung R&D Institute UK Ok

Moderator summary □ all companies are fine to for the BL CR assignment.

Proposal: Endorse the BL CR assignment.

4.2 LS on FS_5MBS_Ph2 progress from SA2

In R3-225321/S2-2207470, SA2 provided their progress on their study and kindly requests RAN2 and RAN3 for feedback on the potential solutions and areas pointing to RAN WGs dependency in TR 23.700-47 to facilitate SA2 reaching conclusions on these key issues. In RAN3 we need to discuss SA2 questions one by one to provide RAN3 answers taking into account the inputs from the submitted contributions.

Note: some details are pending to the discussion in 15.2 and 15.3, the draft answers will be further updated afterwards.

4.2.1 Answers to SA2 questions

SA2 understands that it is NG-RAN decision on how to deliver MBS data to the UEs and whether to transition UEs receiving MBS data in an MBS session to RRC Inactive state.

SA2 is discussing whether AFs can recommend not to enable the function in NG-RAN for inactive reception for MBS sessions which are particularly sensitive for packet loss. Further, SA2 is discussing solutions where some UEs might not be suitable to be sent to RRC Inactive state (e.g., priority users in a multicast group).

SA2 is also discussing "assistance information" that can be provided by the core network (possibly based on input from the AF) to assist NG-RAN in those decisions.

Q1: SA2 would also like to understand:

Q1 a) If there are significant differences in the quality and reliability of the reception of MBS data between UEs in RRC Connected state and UEs in RRC Inactive state

Inputs from contributions:

- [R3-225660 Huawei] Yes, the reception quality and reliability of the reception of MBS data between UEs in RRC Connected state and UEs in RRC Inactive state may be different, as the PTP transmission/retransmission and UL feedback, and Seamless/lossless mobility are only supported for RRC Connected UEs.
- [R3-225533 Nokia] RAN3 understanding is that the quality and reliability of the reception of MBS data can be higher in RRC_CONNECTED state compared to RRC_INACTIVE state, due to benefit of e.g. HARQ feedback.
- [R3-225445 Ericsson] There is no uplink feedback when the UE is in RRC_INACTIVE, e.g. when the UE is at the cell border or in bad coverage the gNB might not be aware of the link quality of the UE. The gNB may and can apply strategies to ensure that UEs receive MBS data according to the QoS required, e.g. it can try to release UEs to RRC_INACTIVE that are in good coverage and stationery with preference, and configure UEs to return to RRC_CONNECTED when reception quality deteriorates,

details to be discussed in RAN2. Please also refer to answers for Q1c. Two additional comments in this context:

- QoS in connected mode cannot be guaranteed at all times, SA2 has introduced in Rel-15 QoS Notification Control for that reason (though not applicable to 5MBS).
- As the main aim of supporting multicast reception in RRC_INACTIVE is to ensure continuation of service in case of congestion, it is believed that it is valid to prioritise service continuity over QoS in such a scenario.
- [R3-225339 Qualcomm] Multicast data reception quality and reliability are different for RRC_CONNECTED and RRC_INACTIVE state UEs due to the availability of L1 and L2 feedback, CSI reporting and re-transmission for RRC_CONNECTED state UEs only.

Based on these inputs, moderator propose to provide the following answer to SA2 Q1a):

Proposed RAN3 answer to SA2 Q1 a):

- Yes, the reception quality and reliability of the reception of MBS data between UEs in RRC Connected state and UEs in RRC Inactive state may be different, as the PTP transmission/retransmission and UL feedback, and Seamless/lossless mobility are only supported for RRC Connected UEs.
- The gNB may and can apply strategies to ensure that UEs receive MBS data according to the QoS required, e.g, it can try to release UEs to RRC_INACTIVE that are in good coverage and stationery with preference, and configure UEs to return to RRC_CONNECTED when reception quality deteriorates.

Feedback Form 2: Any comment to the above proposed RAN3 answer to SA2 Q1 a)?

<p>1 – Nokia France</p> <p>OK for us</p>
<p>2 – Qualcomm Incorporated</p> <p>1st part is OK.</p> <p>2nd part is not needed in reply LS . Particularly when the UE is allowed to try resuming from INACTIVE based e.g. on deteriorating channel condition, there is risk of ping pong, i.e. UE may try to resume while NW sends back to INACTIVE, causing signaling overhead. This is new UE behavior and needs discussion in RAN2 (not RAN3 scope).</p>
<p>3 – ZTE Corporation</p> <p>the two part appears to contradict each other.</p> <ul style="list-style-type: none">- The second part is OK to us. The reason "gNB may and can apply strategies" is to realise the QoS it promised during admission control, which is what we should do for multicast, or any other session.- Since Q1a is asking whether there will be significant differences, it should be no.

4 – Ericsson LM

add a primer to the 2 bullets above stating that *QoS requirements apply to the provision of the multicast session as such, independent from the strategy a gNB applies to achieve their fulfilment.*

5 – CATT

For the first part, we are OK with the statement. However, as clarified by ZTE, what SA2 asked is whether there is significant difference, then the answer should be no.

Ok with the second part.

6 – FirstNet

SA2 asked if there is a significant difference in quality and reliability between UEs in RRC_CONNECTED and RRC_INACTIVE states. Unfortunately, SA2 did not indicate what they mean by “significant.” We acknowledge that RRC_INACTIVE UEs will not provide H-ARQ feedback and may therefore experience a somewhat higher error rate than RRC_CONNECTED UEs. However, whether this difference is significant or not depends on service requirements.

7 – AT&T

We believe the reply to SA2 requires more than a simple “yes” or “no”. The QoS delivered to an MBS session, regardless of the state (RRC_CONNECTED or RRC_INACTIVE) is a function of the gNB implementation. Further, as FirstNet notes, SA2 asked if there are significant differences in the quality and reliability of the reception of MBS data. We interpret “significant” as a distinction at the service level, and as such, the answer should be “no”. We believe the second part of the answer (regarding gNB implementation) is relevant to SA2’s query and should be included.

Moderator summary: on the RAN3 answer to SA2 Q1 a), for the proposed answer, most companies are fine, except one company think the 2nd part is not needed. There is comment about answer to “significant difference” should be no, and also a suggested sentence before these two bullets.

Proposal: Reply SA2 Q1 a) that there may be difference but no significant difference, and clarify the RAN3 understandings based on the inputs, detailed wording to be discussed in second round.

Q1 b) If it is possible, as part of the same MBS session, to have some UEs receiving in RRC Connected state, while other UEs receiving in RRC Inactive state

Inputs from contributions:

- [R3-225660 Huawei] Based on the RAN2 agreement made during RAN2#119-e meeting that “It is supported that gNB transmit one multicast session to both UEs in CONNECTED and INACTIVE in the same cell.”, the answer to this question is yes.
- [R3-225533 Nokia] this is RAN3 assumption.
- [R3-225445 Ericsson] This would be up to RAN2 to be finally answered, but it is understood to be a prerequisite of the overall Rel-18 approach, with the gNB staying in control of the RRC state.

- [R3-225339 Qualcomm]It is possible to have some UEs receiving in RRC_CONNECTED state and other UEs receiving in RRC_INACTIVE state.

Based on these inputs, moderator propose to provide the following answer to SA2 Q1 b):

Proposed RAN3 answer to SA2 Q1 b):

- Yes, this is RAN3 assumption and aligned with RAN2 agreement that “It is supported that gNB transmit one multicast session to both UEs in CONNECTED and INACTIVE in the same cell.

Feedback Form 3: Any comment to the above proposed RAN3 answer to SA2 Q1 b)?

1 – Nokia France OK
2 – Qualcomm Incorporated OK
3 – ZTE Corporation Quite possible for UE with PDU session communication it stays in RRC_CONNECTED, and others released to RRC_INACTIVE.
4 – Ericsson LM OK
5 – CATT OK
6 – Samsung R&D Institute UK Ok

Moderator summary: all companies are fine for the proposed answer to SA2 Q1 b).

Proposal: Confirm SA2 Q1 b) and clarify that it is RAN3 assumption and aligned with RAN2 agreement that “It is supported that gNB transmit one multicast session to both UEs in CONNECTED and INACTIVE in the same cell.”

Q1 c) If the answer to b) is yes, will a UE incur MBS data loss while transitioning (under NG-RAN control) between RRC Connected state and RRC Inactive state in the middle of MBS data session? If yes, how long can the reception outage be?

Inputs from contributions:

- [R3-225660 Huawei] It belongs to RAN2 scope and could be answered by RAN2.
- [R3-225533 Nokia] RAN2 to answer.
- [R3-225445 Ericsson] When a Rel-17 UE is receiving MBS broadcast in RRC_CONNECTED and the UE is released to RRC_INACTIVE or RRC_IDLE, then the UE does not release the broadcast MRB on PCell, i.e. broadcast reception continues in such case. Any interruption or loss is dependent on the UE implementation, but it is expected to be limited. A similar approach can be assumed for the multicast MRB, i.e. the UE can continue to receive the PTM transmissions, but is also able to receive HARQ retransmissions that are triggered by other UEs. Furthermore, in case of congestion a short interruption seems acceptable if it enables the UE to continue to receive the service.
- [R3-225339 Qualcomm] It may be possible some potential data loss and it is up to RAN2 to specify mechanisms to minimize or avoid data loss. From RAN perspective, interruption can be of the order of few milliseconds.

Based on these inputs, moderator propose to leave SA2 Q1 c) to RAN2 to answer.

Feedback Form 4: Any comment to leave SA2 Q1 c) to RAN2 to answer?

1 – Nokia France Agree.
2 – Qualcomm Incorporated ok
3 – ZTE Corporation OK.
4 – Ericsson LM OK
5 – CATT OK
6 – Samsung R&D Institute UK Ok

Moderator summary: all companies agree to leave SA2 Q1 c) to RAN2 to answer.

Proposal: Leave SA2 Q1 c) to RAN2 to answer

Q1 d) Whether the existing QoS parameters of MBS QoS Flow(s) are enough or some additional parameter is needed for NG-RAN to differentiate different MBS session and UE, which can be used by NG-RAN to decide how to deliver the MBS data.

Inputs from contributions:

- [R3-225660 Huawei]
 - For the MBS session handling: the existing MBS session QoS parameter is enough for differentiate different MBS session on whether can be provided to RRC Inactive UEs, e.g. ARP, 5QI.
 - For the case differentiate the different UE: As the MBS session related QoS Parameters are the same for different UEs within the same MBS session, the existing QoS Parameters of MBS QoS Flow(s) are not enough for NG-RAN to differentiate handling for different UE.
- [R3-225533 Nokia]
 - 1/ To differentiate between MBS sessions, the AF may have valuable information from which 5GC could derive and send to NG-RAN a “Recommendation” whether a multicast MBS session is subject to reception in RRC_INACTIVE state or not. It will then be up to NG-RAN node take final decision taking into account the received existing QoS parameters i.e. we don’t see the need for additional QoS parameters at this stage.
 - 2/ To differentiate the delivery between UEs, RAN3 think that it could be useful if gNB receives an indication whether a UE needs to stay RRC_CONNECTED when receiving a multicast MBS session. It seems enough to have this indication per UE and not per MBS session.
- [R3-225445 Ericsson]
 - The current 5G QoS model is sufficiently detailed to specify packet loss requirements etc. of any sort. The 5G QoS model was agreed in Rel-17 to be applicable for NR MBS and 5G QoS parameters are provided to NG-RAN for MBS Sessions. There is no need for any additional information.
 - The existing QoS parameters can be used for deciding from which sessions UEs are eligible to be released to RRC_INACTIVE (e.g. 5QI values for mission critical are prioritized over other sessions (65, 67, 69, 70), and in case there are multiple mission critical sessions the Packet Error Rate can be used for possible differentiation, see TS 23.501), i.e. no need for additional QoS parameters.
- [R3-225724 CATT]
 - The core network may provide some assistance information toward the NG-RAN to help deciding whether to use the feature of multicast over RRC_INACTIVE. Such assistance information may include at least an indicator whether such mode is allowed.
- [R3-225339 Qualcomm]
 - Based on interaction between AF and 5GC, it is also possible for 5GC/AMF to provide assistance information to RAN whether a UE is allowed to receive Multicast data while being in RRC_INACTIVE state and whether a Multicast session is allowed to be received by RRC_INACTIVE state UEs. This assistance information can be used by RAN to make appropriate decision for UEs and Multicast session. We think decision to receive Multicast service in RRC_INACTIVE state is totally up to RAN decision and UE is not expected to provide any UE preference

- From RAN3 perspective, existing QoS parameters of MBS QoS flows are enough and based on different values of QoS parameters, RAN can decide whether to deliver Multicast data in RRC_INACTIVE state or not.
- [R3-225854 ZTE] Reuse alternative QoS profile and QoS notification framework for Rel-18 NR MBS at least for multicast session. No addition information (per multicast session level or per UE level) is needed by the gNB.

Based on these inputs, moderator propose to provide the following answer to SA2 Q1 d):

Proposed RAN3 answer to SA2 Q1 d): (subject to the discussion in 15.2)

- To differentiate between MBS sessions: RAN3 don't see the need for additional QoS parameters on this, the existing MBS session QoS parameter is enough for differentiate different MBS session on whether can be provided to RRC Inactive UEs. It will then be up to NG-RAN node take final decision taking into account the received existing QoS parameters.
- To differentiate the delivery between UEs: As the MBS session related QoS Parameters are the same for different UEs within the same MBS session, the existing QoS Parameters of MBS QoS Flow(s) are not enough for NG-RAN to differentiate handling for different UE. RAN3 think that it could be useful if NG-RAN receives an indication whether a UE needs to stay RRC_CONNECTED when receiving a multicast MBS session. It seems enough to have this indication per UE and not per MBS session.

Feedback Form 5: Any comment to the above proposed RAN3 answer to SA2 Q1 d)?

1 – Nokia France

For the first part (MBS session), even though no new QoS parameters are needed in the QoS profile, we could add the following: "it is up to SA2 to decide if 5GC can send a "recommendation to gNB whether a multicast session is eligible to reception in RRC inactive state. It will then be up to NG-RAN node to take the final decision".

Second part (UEs) is OK.

2 – Qualcomm Incorporated

for 1st part, we are fine with Nokia proposed edit.

2nd part is OK.

3 – ZTE Corporation

OK with first part. NOK for the second.

- A good architecture design asks for clean decoupling.

- We don't think it is a good idea to expose RAN scheduling mechanism (multicast reception in RRC_INACTIVE) to 5GC or even AF.

- From this perspective, existing info collectively available at gNB shall be enough for RAN to make decision.

- Any other inputs will only make the scheduling even more complicated which is unnecessary.

Whether per UE shall be allowed to be released, can be easily figured out by AF, e.g., by keep-alive signal.

4 – Ericsson LM

(ad 1st bullet)

QoS parameters are actually QoS flow parameters, not session parameters.

(ad 2nd bullet)

Existing QoS parameters (or other already existing UE specific information from 5GC) are sufficient, no need for new information as proposed in the second bullet.

5 – CATT

For the first part, disagree with current statement. We share similar view with Nokia, i.e. per session level indicator from 5GC could provide assistant information to NG-RAN node on whether data on this MBS session could be provided to inactive UE.

6 – Samsung R&D Institute UK

we also think the existing QoS parameters for per Session QoS flow and for per UE is enough to help NG-RAN make decision.

Moderator summary:

All companies think for existing QoS parameters can be used to differentiate between MBS sessions, 3 company think it is up to SA2 to decide whether a new recommendation is needed or not.

3 companies agree that to differentiate the delivery between UEs, the existing QoS Parameters are not enough and therefore per UE indication from 5GC on whether a UE needs to stay RRC_CONNECTED when receiving a multicast MBS session is needed. 3 companies think that there is no such need.

Proposal: Reply SA2 Q1 d) that existing QoS parameters can be used to differentiate between MBS sessions, it is FFS on the need of new indication from 5GC in per session level and/or per UE level.

Q2: SA2 would like to receive feedback on the value of such assistance information from RAN perspective?

Inputs from contributions:

- [R3-225660 Huawei] RAN3 agreed in RAN3#117-e meeting that the gNB may take the following information into account when deciding to enable UEs receiving multicast in RRC_INACTIVE state, including the capability of UE (of whether support the mode “multicast over RRC inactive”), the rel-17 multicast context, e.g. the QoS parameters not associated to any specific UE, and the parameters available at the local gNB without enhancement on interfaces, e.g. cell load. RAN3 confirm that the assistance information is needed when differentiate UE.
- [R3-225533 Nokia] the above information is seen as valuable from RAN3 perspective.

- [R3-225445 Ericsson] It might be beneficial for the gNB to receive CN assistance information about UEs that should preferably not be sent to RRC_INACTIVE (e.g., priority and/or active users in a multicast group). Rel-15 included in NGAP “Expected UE Activity behaviour”, even on PDU session level, which could be used as well.
- [R3-225339 Qualcomm] From RAN3 perspective it is useful for RAN to receive assistance information from 5GC.

Based on these inputs, moderator propose to provide the following answer to SA2 Q2:

Proposed RAN3 answer to SA2 Q2:

- RAN3 confirm that additional assistance information is needed and valuable.
- RAN3 agreed that the gNB may take the following information into account when deciding to enable UEs receiving multicast in RRC_INACTIVE state, including the capability of UE (of whether support the mode “multicast over RRC inactive”), the rel-17 multicast context, e.g. the QoS parameters not associated to any specific UE, and the parameters available at the local gNB without enhancement on interfaces, e.g. cell load.

Feedback Form 6: Any comment to the above proposed RAN3 answer to SA2 Q2?

<p>1 – Nokia France</p> <p>text could be updated with ”at least” i.e. RAN3 agreed that the gNB may take at least the following information into account... this is because other assistance can still be agreed.</p>
<p>2 – Qualcomm Incorporated</p> <p>Ok, but we are fine to add ”at least” so that any additional info can be taken into consideration later.</p>
<p>3 – Ericsson LM</p> <p>Not ok.</p> <p>the SA2 question was about “assistance information”, not “additional assistance information”. Whether new indications would need to be introduced depends on further details provided by SA2, but for now we don’t see any justified.</p>
<p>4 – ZTE Corporation</p> <p>agree with Ericsson. From RAN perspective it is more about execution. More inputs from 5GC will definitely make the decision making in RAN more complicated.</p> <p>For now, we dont think any need more assistance info other than existing info is justified.</p>
<p>5 – CATT</p> <p>We also support to include ”at least” in the statement.</p>

6 – Samsung R&D Institute UK

Not ok for the first sentence, SA2 asked about the assistance information mentioned in the LS. The existing QoS parameter maybe reused for that purpose.

Moderator summary: Several companies would like to feedback on “assistance information” instead of “additional assistance information”, so let’s do it. and for the second bullet, seems fine for all with the “at least” proposed by Nokia.

Proposal: Reply SA2 Q2 that such Assistance information is needed and valuable and clarify that the gNB may take at least the e the following information into account when deciding to enable UEs receiving multicast in RRC_INACTIVE state, including the capability of UE (of whether support the mode “multicast over RRC inactive”), the rel-17 multicast context, e.g. the QoS parameters not associated to any specific UE, and the parameters available at the local gNB without enhancement on interfaces, e.g. cell load.

SA2 assumes that backward compatibility with Rel-17 UEs will be ensured and that NG-RAN will need to know whether the UEs it serves have the Rel-18 MBS capability to receive multicast in RRC_INACTIVE state.

Q3: SA2 would like to ask if the UE radio capability provided directly from UE to NG-RAN will contain the information whether the UE supports Rel-18 MBS capability to receive multicast data in RRC_INACTIVE state?

Inputs from contributions:

- [R3-225660 Huawei] It belongs to RAN2 scope and better to be answered by RAN2.
- [R3-225533 Nokia] RAN2 to answer.
- [R3-225445 Ericsson] SA2 should expect that Rel-17 UEs do not support multicast reception in RRC_INACTIVE. SA2 can assume that the gNB has information available whether a UE in CM-CONNECTED supports Rel-18 MBS features.
- [R3-225339 Qualcomm] From RAN3 perspective, R18 MBS UE is expected to indicate its capability of receiving Multicast data in RRC_INACTIVE state and it is up to RAN2 to specify such UE capability.

Based on these inputs, moderator propose to leave SA2 Q3 to RAN2 to answer.

Feedback Form 7: Any comment to leave SA2 Q3 to RAN2 to answer?

1 – Nokia France

OK

2 – Qualcomm Incorporated

ok

3 – ZTE Corporation OK
4 – Ericsson LM OK
5 – CATT OK
6 – Samsung R&D Institute UK Ok

Moderator summary: all companies are fine to leave it to RAN2 to answer.

Proposal: Leave SA2 Q3 to RAN2 to answer.

SA2 assumes, when **MBS session is activated**, the UEs that have previously joined the MBS session and are in RRC Inactive state, may either be kept in RRC Inactive state, or be transitioned to RRC Connected state to receive the MBS session data, depending on NG-RAN decision. The core network will continue to inform RAN nodes about MBS session activation to enable NG-RAN to send appropriate signalling to the UEs in the multicast group.

Q4: SA2 would like to clarify with RAN WGs whether the assumption that IDLE UE will need to transition to connected state to start receiving the MBS data and CN initiated group paging (as defined in Rel-17) is thus still required for such UEs?

Inputs from contributions:

- [R3-225660 Huawei] Yes, idle UE will need to transit to connected state and thus the CN initiated group paging is still need to be performed.
- [R3-225533 Nokia] Yes. IDLE UEs will need to transition to connected state with CN paging.
- [R3-225445 Ericsson] It is assumed that, as in Rel-17, NG-RAN is informed about session activation and that CM-IDLE UEs are group paged. How a gNB manages to configure UEs with multicast resources, especially in a congestion situations, is up RAN WGs to develop.
- [R3-225339 Qualcomm] Yes, RRC_IDLE state UEs are required to transition to RRC_CONNECTED state upon receiving CN initiated Group Paging in order to start receiving Multicast data.

Based on these inputs, moderator propose to provide the following answer to SA2 Q4:

Proposed RAN3 answer to SA2 Q4:

- Yes, idle UE will need to transit to connected state and thus the CN initiated group paging is still need to be performed.

Feedback Form 8: Any comment to the above proposed RAN3 answer to SA2 Q4?

1 – Nokia France OK for us.
2 – Qualcomm Incorporated Agree
3 – ZTE Corporation Agree
4 – Ericsson LM We should be rather more specific and say that group paging is expected to be kept at least for Rel-17 UEs. Whether Rel-18 IDLE UEs will be reached via CN group paging is not finally decided and out of RAN3 scope.
5 – Samsung R&D Institute UK Agree

Moderator summary: all companies are fine for the proposed answer, one company suggest to provide more specific feedback y that group paging is expected to be kept at least for Rel-17 UEs. Whether Rel-18 IDLE UEs will be reached via CN group paging is not finally decided and out of RAN3 scope, moderator tend to agree with this suggestion.

Proposal: Confirm SA2 Q4, and clarify that group paging is expected to be kept at least for Rel-17 UEs. Whether Rel-18 IDLE UEs will be reached via CN group paging is not finally decided and out of RAN3 scope.

Q5 First part: When MBS Session is activated and MBS data allowed to be received in RRC_INACTIVE state, is it possible that the RRC_INACTIVE UE receives MBS data without going back to RRC connected state? If possible, when the MBS session is being activated, how is the RRC_INACTIVE UE notified?

Inputs from contributions:

- [R3-225660 Huawei] It is possible that the RRC_INACTIVE UE receives MBS data without going back to RRC connected state. And when the MBS session is being activated, it is assumed that the gNB will be able to notify these inactive UEs to receive the MBS data, FFS on the detailed solution.
- [R3-225533 Nokia] yes, it is possible. It is desirable that standards means are provided so that when gNB decides that it is useful, UEs in RRC_INACTIVE state are not transitioned to RRC_CONNECTED state at activation time to receive the multicast if they are capable. gNB decision however may depend on several factors such as e.g. QoS required for the MBS session (i.e. acceptable to be received in RRC_INACTIVE state), number of UEs in the cell (spectral efficiency good enough to

setup delivery mode for RRC_INACTIVE in the cell). Because the decision typically depends on the number of UEs eligible to receive the multicast in RRC_INACTIVE state in the cell, it is FFS whether gNB should have some counting mechanism to evaluate this number.

- [R3-225445 Ericsson] This is for RAN2 to finally answer, but assumed by RAN3.
- [R3-225339 Qualcomm] Yes, it is possible for RRC_INACTIVE state UEs to receive Multicast data upon activation of Multicast session without resuming RRC_CONNECTION. It is up to RAN2 to specify how to notify RRC_INACTIVE UE when Multicast session is activated.

Based on these inputs, moderator propose to provide the following answer to SA2 Q5 First part:

Proposed RAN3 answer to SA2 Q5 First part:

- It is possible that the RRC_INACTIVE UE receives MBS data without going back to RRC connected state. And when the MBS session is being activated, it is assumed that the gNB will be able to notify these inactive UEs to receive the MBS data, FFS on the detailed solutions which is up to RAN2.

Feedback Form 9: Any comment to the above proposed RAN3 answer to SA2 Q5 First part?

<p>1 – Nokia France</p> <p>OK for us.</p>
<p>2 – Qualcomm Incorporated</p> <p>Agree</p>
<p>3 – ZTE Corporation</p> <p>”up to RAN2” will be good enough. before RAN2 makes a decision, I dont think we can say anything like ”it is possible”</p>
<p>4 – Ericsson LM</p> <p>any specific reason to not leave this up to RAN2 to answer, like for the other questions?</p>
<p>5 – CATT</p> <p>Could be left to RAN2</p>
<p>6 – Samsung R&D Institute UK</p> <p>Agree</p>

Moderator summary: some companies are fine for the proposed answer, and 3 companies would like to leave it to RAN2 to answer. To avoid overlapping answers, let’s leave it to RAN2 as well.

Proposal: Leave SA2 Q5 first part to RAN2 to answer.

Q5 Second part: For group paging initiated for IDLE UEs, does RRC_INACTIVE UE respond to such paging?

Inputs from contributions:

- [R3-225660 Huawei] For group paging initiated for idle UEs, per Rel-17 specification, the RRC inactive UEs will also respond to such paging. However, for Rel-18, if the MBS session can be received in RRC inactivated state, the RRC inactive UE need not go back to RRC connected state. It is FFS how to avoid these UEs going back to RRC connected state if the CN group paging is received.
- [R3-225533 Nokia] when gNB decides at activation time that RRC_INACTIVE UEs need not transition to RRC_CONNECTED state, group paging for RRC_IDLE UEs should not trigger RRC_INACTIVE UEs to respond and go connected, like for the RAN paging for RRC_INACTIVE UEs.
- [R3-225445 Ericsson] This is for RAN2 to answer for Rel-18 UEs, but Rel-17 UEs are assumed to return to RRC_CONNECTED

Based on these inputs, moderator propose to provide the following answer to SA2 Q5 Second part:

Proposed RAN3 answer to SA2 Q5 Second part:

- Rel-17 UEs are assumed to return to RRC_CONNECTED. For Rel-18, group paging for RRC_IDLE UEs should not trigger RRC_INACTIVE UEs to respond and go connected, FFS on the detailed solutions.

Feedback Form 10: Any comment to the above proposed RAN3 answer to SA2 Q5 Second part?

1 – Nokia France slight modification: add the word "necessarily" here: "group paging for rrc idle UEs should not necessarily trigger RRC_inactive UEs to respond and go connected.." this is ebcasue it could be a gNB decision.
2 – Qualcomm Incorporated Agree with Nokia suggestion above
3 – ZTE Corporation we can have RAN2 to decide.
4 – Ericsson LM any specific reason to not leave this up to RAN2 to answer, like for the other questions?
5 – CATT Could be left to RAN2

6 – Samsung R&D Institute UK

Could leave it to RAN2

Moderator summary: similar status as Q5 first part, to avoid overlapping answers from different groups, let's leave it to RAN2 to answer.

Proposal: Leave SA2 Q5 Second part to RAN2 to answer.

Regarding the **mobility within the RAN Notification Area (RNA)**, SA2 assumes the UE in RRC Inactive state should be able to continue receiving DL multicast MBS data within its RNA and the solution will be determined by RAN WGs as RRC_INACTIVE mobility is under the remit of RAN WGs.

Q6: SA2 would like to confirm with RAN WGs the above assumption.

Inputs from contributions:

- [R3-225660 Huawei] Yes, the UE in RRC Inactive state shall be able to continue receiving DL multicast MBS data within its RNA. For active session, if the configuration of the session is not available for the new cell, the UE will resume RRC connection to trigger the establishment of the session in the new cell or get the multicast MRB configuration.
- [R3-225533 Nokia] RAN3 confirms.
- [R3-225445 Ericsson] RAN3 does not agree with this assumption. First, UEs should only receive multicast in RRC_INACTIVE when there is congestion and the UE cannot receive it in RRC_CONNECTED. Secondly, RAN3 believes that it would be a better approach to decouple RNA configuration from RRC_INACTIVE reception in general, to keep flexibility in the overall concept and avoid massive signalling if e.g. reconfiguration of the RRC_INACTIVE reception area is needed.
- [R3-225724 CATT] It may ordinarily be true, depending on the detail solution adopted in RAN, that the UE in RRC INACTIVE state is able to continue receiving DL multicast data within its RNA, but RAN3 does not see it as a requirement which should be satisfied.
- [R3-225339 Qualcomm] From RAN3 perspective it is possible for RRC_INACTIVE UEs to continue to receive Multicast data within RNA without resuming RRC_CONNECTION.
- [R3-225854 ZTE] Multicast reception area can reduce the possibility of RRC resume for UEs in RRC_INACTIVE. Multicast reception area can improve the network scalability and the continuity of multicast reception. RAN3 introduces the multicast reception area, in such area an UE in RRC_INACTIVE is able to continue the multicast reception without RRC state transitioning.

Based on these inputs, moderator propose to provide the following answer to SA2 Q6:

Proposed RAN3 answer to SA2 Q6:

- The UE in RRC Inactive state shall be able to continue receiving DL multicast MBS data within its RNA, i.e. for an active session, if the configuration of the session is not available for the new cell, the UE will resume RRC connection to trigger the establishment of the session in the new cell or get the multicast MRB configuration.

Feedback Form 11: Any comment to the above proposed RAN3 answer to SA2 Q6?

1 – Nokia France OK for us.
2 – Qualcomm Incorporated Agree
3 – ZTE Corporation in 15.3 "multicast RAN area vs RNA" is being discussed. one safe answer would be: <u>The UE in RRC Inactive state shall be able to continue receiving DL multicast MBS data after cell re-selection within its RNA, i.e. for an active session, if the configuration of the session is not available for the new cell, the UE will resume RRC connection to trigger the establishment of the session in the new cell or get the multicast MRB configuration. detailed solution is FFS.</u>
4 – Ericsson LM rather reply: It is assumed that Rel18 supports UEs to re-select cells in RRC_INACTIVE and continue reception of DL multicast data w/o resuming to RRC_CONNECTED. The conditions under which and the methods with which UEs are enabled for that are under discussion in RAN2 and RAN3.
5 – CATT For the first half sentence, we think it is better to be limited to the scenario that if the configuration of the MBS session is available.
6 – Samsung R&D Institute UK Agree.

Regarding the **MOCN RAN sharing for broadcast**, SA2 has several alternatives for this key issue#2. Some solutions assume MOCN RAN nodes can identify the same MBS service by the information provided by 5GC while some solutions can identify the MBS service is for MOCN RAN nodes based on configuration. SA2 considers backward compatibility with Rel-17 UEs as important.

SA2 is discussing whether it is feasible to use a single TMGI, with or without a special MNC within the TMGI to identify it as MOCN TMGI, or with an additional MOCN flag in signalling from CN towards RAN, or different TMGIs with additional identifier for multiple MBS broadcast sessions transferring the same content for different PLMNs.

Moderator summary: companies are fine for the proposal with some modifications, by taking the feedback into account, moderator would like to propose as follows□

Proposal: Reply SA2 Q6 that the It is assumed that R18 UEs in RRC Inactive state shall be able to re-select cells in RRC_INACTIVE and continue reception of DL multicast data, without or with resuming to RRC_CONNECTED based on whether the configuration for the new cell is available or not. Details are under discussion in RAN2 and RAN3.

Q7: SA2 would like to know if RAN considers any aspects of the proposed solutions for KI#2 as not feasible or desirable from RAN perspective?

Inputs from contributions:

- [R3-225660 Huawei] The NG-RAN shall be able to identify the MBS session signalling from different operators' 5GCs aim at the same MBS session. The same PTM radio resource can be allocated in a shared cell for transmission of the same MBS service provided by different operators. The solution provided by RAN3 work on protocol will not have impact on Pre Rel-18 UEs. There is a preference on solution #2 and #7 due to flexibility and the support of Rel-17 UEs. (Pending to further discussion in this meeting)
- [R3-225533 Nokia] RAN3 considers that the solution using identification of the MBS service via configuration leads to heavy configuration impacts on the RAN nodes, which should be avoided. Among the signaling solutions, RAN3 let SA2 decide but solutions using a single TMGI would of course lead to less RAN impacts compared to solutions using multiple TMGIs.
- [R3-225445 Ericsson] RAN3 has discussed the various approaches and prefers solutions which provide a "native" TMGI to the gNBs, i.e. TMGIs containing a PLMN ID supported by the sending 5GC. By that, backwards compatibility to Rel-17 is ensure and gNB which do not, or only partly share radio resources would be provided with Rel-17 information. Avoiding 5GCs participating in RAN sharing to process information on whether a gNB share radio resources, and hence assuming that 5GC provides the same session identification to all NG-RAN nodes in the service area, would ensure maximising separation of RAN and CN functions and provides another aspect for the above mentioned preference.
- [R3-225340 Qualcomm] From RAN3 perspective it is feasible for MOCN RAN nodes to identify the same Broadcast MBS service either by using additional information provided by 5GC or based on RAN OAM configuration method without any 5GC provided assistance. However, RAN3 prefers MOCN RAN OAM configuration method and this will help to avoid any additional NG-AP signalling impacts
- [R3-225724 CATT] To avoid much configuration efforts and also considering backward compatible support for Rel-17 UE, it is desirable to adopt solution#2 and solution #7 for resource efficiency for MBS reception in RAN sharing scenario. As to the tunnel(s) established between NG-RAN node and MB-UPF for RAN sharing scenario, establishment of two tunnels i.e. Primary tunnel and backup tunnel, could be considered. Besides, RAN3 also discussed applicability of the solution on broadcast to multicast service and the have the following conclusions: 1 Same information could be used for NG-RAN node to identify the MBS services which aimed at the same MBS content for broadcast and multicast. 2 In case the information is provided by 5GC, the corresponding NGAP message and procedure on support of efficient MBS reception in RAN sharing scenario for broadcast and multicast would be different. For multicast, the information could be provided via either PDU Session Modification procedure or Distribution Setup procedure while it is provided via Broadcast setup procedure for broadcast service.
- [R3-225797 CMCC] It is proposed to choose a solution which avoids the enhancement on 5GC and RAN simultaneously, but RAN3 finally needs wait for the decision from SA2.
- [R3-225853 ZTE] RAN3 considers backward compatibility with Rel-17 UEs as important. TMGI on Uu interface consists of two parts: service ID and PLMN specific ID. PLMN info can be an index or full ID. For single TMGI solution, the impacts to UE selection to PLMN is not clear. From RAN3 perspective, option 3, i.e., different TMGIs with additional identifier, is the solution with least spec impacts in all level.

Based on these inputs, moderator propose to provide the following answer to SA2 Q7:

Proposed RAN3 answer to SA2 Q7:(subject to the discussion in 15.2)

- RAN3 suggest to select the solution which does not impact Rel-17 UEs, backward compatible for Rel-17 RAN nodes, and not lead to heavy configuration impacts on the RAN nodes. RAN3 has discussed the various approaches and prefer to select a solution which provide a “native TMGI to the gNBs, i.e. TMGIs containing a PLMN ID supported by the sending 5GC.

Feedback Form 12: Any comment to the above proposed RAN3 answer to SA2 Q7?

1 – Nokia France

We disagree with most of the answer.

For backwards compatibility with R17 UEs, all solutions are backwards compatible to our understanding.

For backward compatibility with R17 gNBs, there is no specified usage today of the PLMN included in the TMGI and therefore the solutions based on single TMGI have no impact. This can be further specified.

We can agree to rule out at this stage the O&M solution in RAN which leads to heavy burden of configuration in RAN O&M, but then the choice between the remaining solutions should be done by SA2 and we cannot agree that we prefer selecting a solution using native ”TMGI” like solution 2 and 7.

As explained in tdoc R3-225945, there are pros and cons to be evaluated by SA2:

- Solution 29 seems to have the limitation at the edge of the shared area (if any) that the border shared cell can only broadcast the neighbor cell IDs of neighbor shared cells and not of neighbor non-shared cells. However, this information element is optional and cell re-selection can also be based on the FSAI in SIB21. This needs to be further investigated by RAN2.

- Solutions 2/7 have the disadvantage to need redundant broadcast of all the MBS configuration multiple times, one for each of the shared PLMNs A,B,C.

Since most of the above points are rather in RAN2 domain, we propose to conclude and reply that from RAN3 perspective both solutions are feasible. RAN3 should then leave it up to SA2 to select the solution as usual and not try to do the job of SA2. Indeed, SA2 will certainly consider in its evaluation all system level arguments altogether such as for example the difficulty to choose an adequate common identifier for the solutions of type b/ or MB-SMF discovery issue which RAN3 cannot assess.

2 – Qualcomm Incorporated

Disagree.

For backward compatibility for R17 UEs , we also think all solutions are backward compatible because UE does not use PLMN within TMGI for any AS or NAS purpose and PLMN is specified as part of TMGI from legacy eMBMS definition and UE mainly uses MBS Service ID within TMGI to identify a given MBS session.

For backward compatibility with gNBs, we have same understanding as Nokia mentioned above.

Technically we do not see any reason to rule out OAM based solution either and it is one of possible solution. we dont agree with the statement ”not lead to heavy configuration impacts on the RAN nodes ” which is specifically intended to remove OAM solution. all other solutions also have signaling impact and we dont see need to favor one solution over other solution at this stage.

we suggest to reply ” From RAN3 perspective it is feasible for MOCN RAN nodes to identify the same Broadcast MBS service either by using additional information provided by 5GC or based on RAN OAM configuration method without any 5GC provided assistance.” Let SA2 make their decision.
3 – ZTE Corporation agree. but refinements are possible after CB in 15.2
4 – Ericsson LM a very balanced answer, we agree
5 – CATT Agree.Could be updated based on the conclusion in 15.2
6 – Samsung R&D Institute UK Agree

Moderator summary: the proposed answer is supported by 4 companies but disagreed by two companies. Considering that this is overlapping with the discussion of AI 15.2, let’s further discuss it after online session of 15.2.

Proposal: Further discuss the answer to SA2 Q7 in second round based on the progress of AI 15.2.

4.2.2 Other proposed feedback to SA2

In R3-225445, it is proposed to also feedback to SA2 with the following two aspects:

- **1)** On Solution #17, which suggests enabling the AMF to get UE join/leave information of a multicast MBS session e.g. in order to avoid processing long UE lists at session activation, RAN3 is delighted about SA2 finally identifying one major bottleneck in the Rel-17 and considering solutions for that it and provides its warmest congratulations. RAN3 would like to ask SA2 to continue on that approach and remind SA2 that such information would also remove the necessity to allocate RAN UP resources for associated PDU Sessions, if not needed.
- **2)** On Solution for Key Issue #1 foreseeing support of inter-gNB mobility, RAN3 suggests simplifying the approach by causing the UEs to resume and perform “normal” handover. RAN2 would need to work on a respective solution in RRC and is asked for feedback.

From moderator’s point of view, for 1), based on S2-2208339, the proponent of Solution #17 considered that “Soln#17 is not recommended as a way forward for KI#6 conclusion. “Therefore, moderator suggest to note the first aspect. For 2), it is up to RAN3/2 further discussion, and no strong need to feedback this to SA2 at this stage.

Feedback Form 13: Any comment to these two aspects? are you fine for moderator’s suggestion?

1 – Nokia France

Agree with moderator's suggestion.
We share the same view.

2 – Qualcomm Incorporated

For 1), we are OK with moderator suggestion. we have concern on 2) because it assumes all INACTIVE UEs to resume RRC Connection at cell edge and perform HO, which causes additional signaling overload and defeats the purpose of RRC_INACTIVE state to reduce RRC_CONNECTED state HO signaling and is not assuming INACTIVE state mobility within a group of cells.

No need to send anything to SA2 on this.

3 – Ericsson LM

RAN3 is given the task to provide comments on the current version of the TR to support SA2 in concluding on recommendations, which we did. Any *technical* reason to not comment on this solution?

Moderator summary: assuming the companies did not provide answer to this question is fine for the moderator's suggestion, it is majority view that we can note these proposals.

Proposal: note the proposal.

5 References

- [1] R3-225321 LS on FS_5MBS_Ph2 progress (SA2) LS in
- [2] R3-225533 Feedback to SA2 on FS_5MBS_Ph2 Progress (Nokia, Nokia Shanghai Bell) discussion
- [3] R3-225660 Consideration on SA2 LS on FS_5MBS_Ph2 progress (Huawei, CBN, China Unicom) discussion
- [4] R3-225661 [DRAFT] Reply LS on FS_5MBS_Ph2 progress (Huawei) LS out To: SA2, RAN2 CC: RAN1
- [5] R3-225761 Plan on Baseline CR assignment for Rel-18 MBS enhancement (CATT) discussion
- [6] R3-225445 On SA2 LS on FS_5MBS_Ph2 progress (Ericsson) Discussion Move to 15.1