3GPP TSG-RAN WG3 #117-e R3-224996

Online, 15th - 24th August 2022

Agenda Item: 9.2.7

Source: Ericsson (moderator)

Title: CB: # 21\_R17MBS\_XnF1E1 - Summary of email discussion

Document for: Discussion

# Introduction

This document summarizes the offline discussions on Rel-17 MBS Corrections, guided by the chair’s summary below

**CB: # 21\_R17MBS\_XnF1E1**

**- Incomplete multicast call flow and other CRs to TS 38.401**

**- Definition of MBS related contexts on NG-RAN interfaces**

**- MRB Type (with bearer type change) and RLC Mode on F1AP**

**- MRB ID range on NG-RAN interfaces, MRB ID change**

**- F1-U Tunnel establishment for the per UE data over the ptp leg (e.g., triggering, CU/DU roles)**

**- Update to F1-U Context Descriptor**

**- Data Forwarding between MBS supporting nodes (e.g., at MBS session level)**

**- Mobility between Supporting node and non-supporting node**

**- Broadcast service and Unicast service co-existence**

**- Misc (e.g., Address management for shared CU UP, codepoints update, F1/E1AP ID, IE namings on HFN/SN for PDCP initialisation, PDCP count "wrap around", MBS specific cause values on network interfaces)**

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

(E/// - moderator)

Summary of offline disc R3-224996

# For the Chairman’s Notes

**general corrections:**

CR for 38.401 in R3-224468 agreed

CR for XnAP in R3-224479 agreed

CR for F1AP in R3-22xxxx (revised 4471) agreed

CR for E1AP in R3-22xxxx (revised 4472) agreed

CR for 38.472 in R3-224473 agreed

CR for 37.482 in R3-224474 agreed

**ptp retransmission and ptp forwarding related agreements**

CR for E1AP in R3-22xxxx (currently draft “ptp E1CR v01”) agreed

CR for F1AP in R3-22xxxx (currently draft revision of “4476 ptp F1 CR\_v02” lastest versions) agreed

support of MBS session level data forwarding tunnel to be continued

**control of MC data forwarding resources on E1**

CR for E1AP in R3-22xxxx (currently draft revision of “4860 E1 CR for Xn-forw\_ASN1\_v02) agreed

corrections to MC message flow in 38.401 to be continued

**support of MRB ID change at (inter-DU) handover**

CR for F1AP in R3-22xxxx (currently draft revision of “4673 MRB ID change delta configuration\_F1AP CR\_R17\_nok\_Eri”) agreed

**correction for shared NG-U termination**

draft LS to SA2 in R3-225124 agreed (draft version available)

hopefully a compromise Nokia/CATT found for “third codepoint” on E1AP

discussions on admission control to be continued

corrections for group paging handled in CB#20

**introducing MBS cause values in F1 and E1AP**

R3-22xxxx (E1AP CR) and R3-22xxxx (F1AP CR) agreed (draft CRs available, revisions of R3-224673/74)

**F1AP support to provide the UE’s interest indication (MII) from CU to DU**

**R3-224333 (F1AP) agreed**

**E1AP correction**

**R3-224644 agreed**

**Exchange of established broadcast resources in neighbor cells on Xn**

discussion on exchange of established broadcast resources in neighbor cells on Xn will be continued in in Rel-18.

# Discussion third round

## General alignment of definitions, missing definitions, etc.

proposed status:

a) CR for 38.401 in R3-224468 agreed

b) CR for XnAP in R3-224470 agreed

c) revised CR for F1AP (revised R3-224471) agreed

d) revised CR for E1AP (revised Re-224472) agreed

e) CR for 38.472 in R3-224473 agreed

f) CR for 37.482 in R3-224474 agreed

**Q1: if there are any final comments, please provide them below.**

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| Company | Comment |
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## Compromise approach for “ptp retransmission” and “ptp forwarding” tunnel handling

latest versions of the CRs take into account comments on the F1-U context reference (same size but different names on E1 and F1) and introducing the MRB RLC type into the UE Context Modification Required message.

draft documents “ptp E1CR v01” and revision of “4476 ptp F1 CR\_v02” lastest versions for agreement

**Q2&Q3**: any final comments?

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## void

## Introducing support of MBS Session level Xn-U data forwarding

**Q4:** Given the divers feedback the moderator proposes to not continue discussing this topic at RAN3#117-e and hopes this is fine. Any final comments?

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| Company | Comment |
| Nokia | Should remain contribution driven. |
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## Control of Xn-U forwarding tunnel resources for MC MBS traffic in E1AP

Agreement to include E1AP functions for configuring Xn-U forwarding tunnel resources.

Also agreement to include QFI mapping information to enable forwarding to non-supporting nodes.

QFI mapping for Session-level forwarding tunnel introduced, NULL changed to ENUMERATED,

further open items subject to next meeting’s contributions

v02 of the relevant E1AP CR provided for agreement

**Q5.1:** Any final comments?

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## Re-structuring TS 38.401 message flow for multicast

rapporteur suggests to postpone this discussion to next meeting.

## Support of MRB ID Change on E1/F1

Agree on latest version (“\_nok\_Eri”) of the revision of the F1AP CR R3-224673

**Q7: any further comments?**

The moderator kindly asks to please provide comments below.

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## Corrections for shared NG-U termination

### shared address management

The moderator suggests to finalize discussions on the draft LS to SA2 provided by Nokia.

**Q8.1: any further comments?**

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### third shared codepoint

There seems to be a compromise between Nokia and CATT available

Nokia/CATT please provide a proposal

**Q8.2: any further comments?**

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## Corrections for MC MBS session admission control

The moderator proposes to close the discussions at RAN3#117-e, to accommodate ZTE et.al concerns this could be put in the agenda for Rel-17 corrections.

**Q0: any further comments?**

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## Correction to Group Paging in F1

**closed, handled in CB#20**

## Introducing MBS cause values in E1AP and F1AP

**General support for introducing MBS specific cause values on E1 and F1**

**Q11:** Final comments on available versions?

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## DU and CU role for deciding the MRB bearer type applied in the UE RRC configuration

**The moderator thanks for the discussion and proposes to close this topic in RAN3#117-e.**

## Broadcast and Unicast Co-existence correction for F1AP

The moderator still proposes trying to agree on the CR in R3-224333, sensing that MII is indeed for the concurrent handling of unicast and broadcast traffic for a UE

so, proposal is the following line **R3-224333 (F1AP) agreed**

**Q13:** Please provide final comments.

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## E1AP ASN.1 Correction for MCBearerContextToModify

**R3-224644 will be reported as agreed**

## Exchange of ongoing broadcast service between neighbor nodes

The moderator proposes to continue this discussion in Rel-18, being aware that not all RRC functions are supported by NG-RAN interfaces.

**Q13:** Please provide final comments.

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# Discussion second round

## General alignment of definitions, missing definitions, etc.

**Q1**:With the proposed changes to E1/F1 (removing F1-U Context Descriptor changes) and the explanations on the scope of MRB ID on F1 are the following CRs agreeable?

a) CR for 38.401 in R3-224468

b) CR for XnAP in R3-224470

c) revised CR for F1AP (revised R3-224471)

d) revised CR for E1AP (revised Re-224472)

e) CR for 38.472 in R3-224473

f) CR for 37.482 in R3-224474

Please provide your comments below.

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| Company | Comment |
| Nokia | ok |
| Huawei | Thank you for your efforts. We have one comment for a) R3-224468:Although it says that “The value of the MRB ID signalled on the Xn/NG interface is the same value as communicated to UEs at the source cell.”, I think you would like to say is about the MRB ID IE used over related Xn/NGAP messages, but whether the target will use the same MRB as source used in the HO command? In case it is allowed for source and target gNBs to use different MRB IDs (in our view it is allowed), then from the target gNB point of view, the target CU setup MRB context at the target DU, in case the source and the target gNB uses different MRB IDs, the target gNB-CU has to inform the target gNB-DU about the source MRB id, i.e. the issue and solution mentioned in proposal 1 of R3-224672/3 is still needed to support delta configuration:**Proposal 1: in F1AP: UE CONTEXT SETUP REQUEST message, the gNB-CU indicates the source/old MRB ID to the gNB-DU for the new MRB to be setup.** [Ericsson: on the target side, the MRBs to used at the target side, ie the “new” configuration, are provided in F1 in MC and UE Context signalling, while the source side MRB IDs, the “old configuration” maybe introduced by the CU in the final RRC Reconfiguration to allow UE to enable delta signaling. Such information is only needed towards the UE, not towards DU. There should be all necessary information available.]Huawei2:during HO, the source gNB provides the *CellGroupConfig* to the target gNB via the *HandoverPreparationInformation*, and to support delta configuration, the target CU will forward the *CellGroupConfig* to the target DU, note that the old MRB ID is included in the container, but as the target CU would like to use a new MRB ID, we do not think the target CU will update the MRB ID within the received and forwarded *CellGroupConfig*, therefore, when the target CU triggers the establish of the MRB with new ID for the UE, the target CU needs to inform the target DU about the old MRB id, in order to help the target gNB-DU to find the previous low layer configurations of that MRB. [Ericsson4: We have 90 percent of the MBS functions only due to the approach to make MRB work as an DRB. This is a gigantic fail. but well. will include the old MRB ID in the F1 protocol.]  |
| ZTE | Appreciate the efforts for the huge package. We have the following concerns though,a) an updated version to 4468 is uploaded. which focuses on the multicast session state and also some editorial correction.b) in revision of F1AP, we fail to find RLC mode [Ericsson: will be included in the UE Context Modifcation Required message, see below answers] and also the MRB config which needs to be synced between CU and DU as some of the companies also pointed out. there will be related E1AP impacts too. [Ericsson: there is no sync, the CU decides the MRB IDs and requests retransmission tunnels, while the DU decides the MRB bearer type] |

## Compromise approach for “ptp retransmission” and “ptp forwarding” tunnel handling

The moderator made an attempt to merge proposals for ptp retransmission/forwarding tunnel handling in the “revised for compromise” subfolder (copied into both, round 1 and round 2 subfolder).

**Q2&Q3**: Is the proposed compromise which foresees support of “ptp forwarding” tunnels and the proposed approach for supporting “ptp retransmisson” for MRB type changes acceptable ? Would even the 2 additional flows in the CR for 38.401 be acceptable?

The following CRs are up for discussion and agreement

a) revised CR for F1AP (revised R3-224476)

b) new CR for E1AP

Further

c) the message flows on “MRB type change” and “ptp forwarding” tunnel related in the revised CR for 38.401 (revised R3-224477) [NOTE: the first 2 flows are part of Q6 below]

**Q2&Q3**: Please provide your comments on that compromise approach:

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| Company | Comment |
| Nokia  | a/ could be OK if 9.2.14.y is removed (we think DU releasing the tunnel is enough). [Ericsson: fine for now]b/ shouldn’t the context descriptor be in the “MRB loop” to avoid sending multiple messages when different types of ptp tunnels have to be setup ? [Ericsson: no, this would require yet another loop in the message, one per action, which was not the intention on the basic design]c/ we would like the steps 2/3 dotted in the activation call flows because it could be optional since PTM configuration in DU could be kept during inactive sessions. [Ericsson: fine] |
| Huawei | For a) and b)* For a) We are confused about how the *UE Multicast MRB Required to Be Modified List* IE included in the UE CONTEXT MODIFICATION REQUIRED message works, in case DU decides the MRB type (we do not prefer), the do you mean that the DU will send *MRB type reconfiguration* IE set to "true" if the DU decides to change the UE from a MRB type which does not support PDCP SR to a MRB type which support? Will there be an extra RRC reconfiguration if the gNB would like to configure the UE to report PDCP SR during the establishment of the MRB for the UE? [Ericsson: this is probably related to Lenovo’s question, but this is what was requested to look into last meeting.]
	+ Huawei2: we propose to remove these things, as they are not clear and should not be captured into the specification(s). [Eri4: so do your propose not support retransmission at MRB change? I don’t quite understand this comment.]
* For a) and b) it is noticed that the new *Multicast F1-U Context Reference* IE proposed to be included in F1AP and E1AP are different, i.e. F1AP uses OCTET STRING (SIZE(3)) and E1AP usesOCTET STRING (SIZE(4)), why we have such difference? Common CU-UP is not the only potential deployment. It is noted that the UE AP ID pairs over E1 and F1 use the same range. . [Ericsson: the reason is that towards E1AP, you have to manage within the MC Bearer Context resources for an MBS Session Resoures that encompasses resources towards NG-U and towards multiple DUs, each of the DUs having their own (DU generated) Multicast F1-U Context Reference, which, towards the CU-UP cannot be the very same, as each DU decides the value of that reference on its own. This is reflected in different sizes on E1 and F1.]
	+ Huawei2: but the DU also may connected to multiple CU-UPs, we prefer to use same range over F1 and E1, especially when these two IEs have exactly the same name. [Eri4: I prefer then to change to 4 OCTETS but to give different names on E1 and F1.]

For c):* In Figure 8.15.1.2-1/2, can we understand that the F1AP multicast Context will only be setup in case the MBS session is active? And to be released when the session become inactive? We thought that in case a session is inactive, it is actually also allowed to establish/keep the related F1-U tunnels…**we are not ok for the first two flows.** And on the other hand, we think we need the flow proposed in R3-224334 (Huawei, CBN, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, CATT, Lenovo), which is the basic call flow which is currently missing. [Ericsson: this was commented by Nokia, I put dotted lines in the revisions. Furthermore, I thought we had the common understanding, that it is beneficial to “disentangle” the flow in showing several “phases”, i.e. joining at inactive and then the activation, in the example, that before the first activation F1-U MC Context is not setup. I guess this should be fine.]
	+ Huawei2: no, in the figure 8.15.1.2-2, the F1 tunnel establishment steps 4-7 are not in dashline yet in your v01.. [Eri4: the F1-C MC Context setup is in dashed lines. I can dash whatever you like ;-)]
* For Figure 8.15.1.2-2, the step 8, assuming that step covers the F1AP UE context modification procedures, in case ptp retransmission/forwarding tunnel is needed, the gNB-CU-UP will also be involved, but currently the box only includes the UE, DU, CU-CP. [Ericsson: step 8 shows the RRC Reconfiguration procedure]
	+ Huawei2: if for a UE, the PTP only MRB using UE specific F1-U tunnel is used, whether the per UE tunnels neeed to be established? If yes, there should be CU-UP involvement. And by the way, whether step 8 includes RAN Group Paigng? [Eri4: group paging is not shown at all]
* For Figure 8.15.1.2-3, similar comment as the comment for a), from the gNB-DU point of view, it will first receive a UE Context Setup/Modification request from the CU, ask to setup MRB (this part is not shown in this figure), and normally the CU will send RRC reconfiguration to the UE, in case we introduce this new MRB type change required from DU, there will be an two times of RRC reconfiguration in order to configure an MRB with PDCP Status Report Required to a UE, is this the correct understanding? [Ericsson: but the change of a MRB type requires that the MRB configuration was already provided to the UE - with the means F1 UE Context signalling would provide. So we think the flow is correct]
	+ Huawei2: but why we use two times of RRC Reconfiguration? I’m not talking about changing MRB type, I’m asking how to directly establish an MRB with PDCP status report required? Whether we need to change the F1AP UE Context Setup Response as well? To indicate MRB type from DU to CU. (this comment made based the solution in which DU makes the decision of MRB type, although it is not preferred by us.) [Alex: it seems the interaction between CU and DU requires twice a RRC reconfiguration, but this is due to the stage 2 requirement to allow that. the only way how to avoid that is to only allow retransmission by means of PDCP SR via an already existing ptp-only resource.]
 |
| Lenovo | a)&c 8.15.1.2-3:the gNB-CU needs to know the RLC mode and bearer type, otherwise the gNB-CU can not configure the PDCP status report to UE. Currently, RAN2 only agrees that PDCP status report can only be apply RLC AM PTP MRB. [Ericsson: having had a second thought on that, I guess we can introduce this information to cover all cases.] |
| ZTE | same concern with Lenovo. |

## void

## Introducing support of MBS Session level Xn-U data forwarding

**Q4:** Given the divers feedback the moderator proposes to not continue discussing this topic at RAN3#117-e and hopes this is fine. Any final comments?

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| Company | Comment |
| Nokia | Should remain contribution driven. |
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## Control of Xn-U forwarding tunnel resources for MC MBS traffic in E1AP

The moderator suggests concentrating on Q5.1 and not continue Q5.2, Q.5,3 and Q5.4 at RAN3#117-e.

Agreement to include E1AP functions for configuring Xn-U forwarding tunnel resources.

Also agreement to include QFI mapping information to enable forwarding to non-supporting nodes.

No consensus whether UE Context reference should be provided on target side to the CU-UP.

**Q5.1:** The moderator still suggests to start with R3-224860, incorporating associated information for QFI mapping and see where we end up. Draft was provided by moderator.

Please provide your comments on that approach below. If you strongly disagree please explain why:

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| --- | --- |
| Company | Comment |
| Nokia | Ok for us given the answers provided below. |
| CATT | Some technical comment:There are two problems for the document in the “for compromise” folder:One is that in XnAP the semantic description of the MRB progress from the source to target and the opposite direction is different. From source to target it is the delivering progress (the highest delivered, although we don’t like such definition), whereas from target to source it is the lowest available one.But in R3-224860 only one new IE of MRB progress is introduced. We don’t know whether it means that it is used for both directions, or it is only used for “lowest available” from target to source, as the for the progress from source to target we can reuse the existing IE *MBS Initial HFN and Reference PDCP SN* (although we don’t like its definition).And another problem is, sadly speaking, the new IE *MBS Session Associated Information* doesn’t work for either direction.For the source side of supporting-to-non-supporting the data forwarding should be per-PDU-session as what we agreed many meetings ago, but we added neither any IE related to providing per-session data forwarding address toward the gNB-CU-UP nor the mapping itself.For the target side of non-supporting-to-supporting,the gNB-CU-UP is neither provided with the UE ID nor with the PDU session ID so it simply doesn’t know what PDU-session NG-U tunnel to compare MBS QFI SN with.Maybe we should further delay the introduction of *MBS Session Associated Information* toward next meeting since the situation is a little bit too complex… |
| Huawei | Cover page does not cover all the changes.Can you clarify the motivation of the *MC Forwarding Resource Release Indication* IE? the target MRB Progress Information is sufficient to determine whether and when to stop data forwarding. [Ericsson: not allowing a node, which requests the setup of resources, to remove the resources, appears as a rather incomplete, if not bad protocol design, wont you agree?]* Huawei2: do we have a data forwarding stop/release indication for normal data forwarding? [Eri4: this cannot be compared to normal data forwarding, as explained in previous occasions.]

For the 9.3.1.a, should the MRB Progress Request IE and the MRB Forwarding Address Request IE be defined as ENUMERATED (true, ...) instead of NULL? [Ericsson: this is possible, and if you prefer to have it as you wish, I could change that]* Huawei2: thank you, please update.

For data forwarding to non-supporting node, when we provide MBS Session Associated Information to the source CU-UP, the per PDU Session level data forwarding address should also be provided, otherwise provide mapping info is useless. [Ericsson: I guess I understood finally the point, right, forget a thing or two of the past]* Huawei2: thank you, please update.
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## Re-structuring TS 38.401 message flow for multicast

There is support to re-structure the MC call flow in TS 38.401 as shown in R3-224477 [26]. The first two flows are agreed.

Further discussions on details in next meeting.

Overlap with “compromise” proposal, but Q2 focusses more on additional flows for MRB type change and “ptp forwarding” tunnel establishment.

**Q6: any strong objects to agree on the first 2 flows in R3-224477 [26]?**

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| Company | Comment |
| Nokia | Almost: as said above we would the steps 2/3 dotted in activation call flow. |
| Google | As raised in first round, for the steps 4/5 for the first figure, we wonder if the UE context modification procedure should be moved to the second figure where the per UE RRC configuration (i.e., before/at step 8) would take place. Or would the gNB-CU-CP hold the obtained CellGroupConfig from the gNB-DU until the MBS session is activated? [Ericsson: this is only for joining] |
| Huawei | See comments above for Q2.1. For the first flow:

The RAN node cannot be able to know the session status until received NGAP distribution setup response message, i.e. step7. Thus, the RAN node cannot decide whether to perform the steps front of step7 when the service status is uncertain. [Ericsson: but fetching the NG-U address and entering “join” info to the UE Context in the DU is possible]* Huawei2: but in current flow, DU will allocate resources in step 4/5, although the session is inactive which is to be known in step 8. [Eri4: the current callflow is not explicit on that, that is one of the reasons why we would like to clarify things. but yes, different interpretations are possible.]

Besides, for deactivation session, whether to allocate F1 tunnel/resources is up to the RAN node implementation. The procedures for establishment of F1-U tunnel and resources cannot be excluded in the call flow. [Ericsson: that is true, but the message flow is just an example.]* Huawei2: no, the message flow is not just an example, it shows how the solution works, and should avoid limitation on different implementations, but currently it is not the case. [Ericsson: no, sorry. stage 2 indeed only show examples. what it should show is a correct example. and if options are shown, this should be well describe.]

Note that there is lack of flow for the multicast context establishment when the first UE join the active session, which will be the most basic process. [Ericsson: that is true, but the flow is just an example, we don’t cover all cases]* Huawei2: we do not agree with you, join an active session is the basic flow which should be captured. [Eri4: ok then I suggest to postpone the discussion]

In additional, there exists the problem that the mandatory QoS Parameters in E1AP MC BEARER CONTEXT SETUP REQUEST message can only be obtained in NGAP Distribution Setup Response message, while the TNL info in NGAP Distribution Setup Request message can only be obtained from E1AP MC BEARER CONTEXT SETUP RESPONSE message. The two processes are closely coupled to each other, which may cause call flow in current TS38.401 to fail to work, as proposed in R3-224919. We should also fix this problem first. [Ericsson: if such information is not available, i.e. in cases different from “HO during active session”, then this information needs to be provided in the modification procedure. would suggest to make the relevant *MC MRB To Setup List* IE (and the IEs in the Response) optional, which requires also to move the *Requested Action for Available Shared NG-U Termination* IE to the *MC Bearer Context To Modify* IE]* Huawei2: or maybe the MBS QoS information can be provided from CN to RAN in PDU Session Modify? Anyway we need to find out a solution, whatever it will be. [Eri: I will try to provide you soon with the approach outlined above.]

Thus, it is strongly recommended that not change the flow to the situation when the first UE join the inactive session, just keep the original shape and fix the imprecise procedures to cover both active session and inactive session, as in R3-224334 (Huawei, CBN, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, CATT, Lenovo). [Ericsson: I thought we had a common understanding to dis-entangle the flow. I am quite confused about your comment now]* Huawei2: we think this flow is better than the first two flows you are proposing now…
1. For the second flow:

We guess this part is about MBS session activation procedure, instead of the MBS session context establishment for an active session. During the MBS session deactivation procedure, whether to release the F1-U tunnel and radio resources is up to the RAN node implementation. We cannot accept that always perform the establishment procedure of F1-U and radio resources when the session activation is triggered. [Ericsson: we have dotted this lines already]* Huawei2: F1-U tunnel part is still not in dash line.

Note that there is also lack of flow for the corresponding MBS session deactivation procedure. [Ericsson: we don’t have to cover all cases in stage 2]**Thus, we are not ok with the first 2 flows in R3-224477. And we propose to use R3-224334 instead. [Ericsson: the reason to suggest not to go that way is that the 1st message is too unspecific, and causes to many misunderstandings what such “trigger message” actually is. It is better to really go for a specific example. also a succession of messages that are all optional does not really help in an example call flow.]*** Huawei2: we think current first two flows cause much more misunderstandings.
 |
| ZTE | **# 1. Surprisingly to see that the concerns raised/observed by companies (e.g., at least ZTE/CMCC/Lenovo/CATT/HW) were ignored:** [Ericsson: sorry, this was not at all my intention. but please see answers for #2 below, which are covering #1 as well]- Are we going to be against that principle agreed in RAN3/SA2 that we shall not allocate any radio resources for an inactive session (but this is apparently not the case in Figure 8.15.1.2-1 of R3-224477) ? - either in UP (ZTE/CMCC/Lenovo in our contribution R3-225040; CATT as in the comment in section 4.6) or - DU (HW in R3-224334 suggests moving the NG-U distribution setup procedure before the related F1AP procedures to get the Multicast status first.)Disappointed to see related section of admission control (3.9) hastily being closed, without really answering the concerns from companies. Also, nothing is too late compared to some of the stage 2 discussion that we are still having in a CR stage (e.g., who to decide MRB type). This is a minor CR from any perspective we can think of, to clean up any possible inconsistencies in our spec.Such concern is also raised from our product team that why are we still allocating resources for an inactive session. we are aware that in 401 they are just "exemplified" message flow, but giving a wrong example in 401 is more than misleading. **# 2. There are also some general issues needs to be clarified:**- for an deactivated signaling, is the logical connection of F1AP to be released? // to us, it should be, according to SA2's definition of multicast session status.- for an deactivated multicast, how about the MRB resources at UP? // to us, it should be removed too, although NG-U tunnel can be kept depending on whether there is still RRC\_CONNECTED UEs. [Ericsson: one thing is whether a node performs admission control and is able to “keep the promise”, the other thing is “how this promise is kept”, which is a matter of implementation. if you do not schedule data for a session, because it is not active, then you can use the resources for other purposes.]- as Google pointed out, what is the order of those combined signaling (per UE and per session)? Why in the CR provided by R3-224477 do we need provided the per UE signaling to DU while the session is still de-activated, is the allocated MRB ID for one UE still justified when the session is activated later? To us such operation shall be taken collectively when the session is activated later. [Ericsson: using a message that enables to provide information destined for different purposes/phases of a session doesn’t mean you have to always provide such information. So, the implementation you have in mind is perfectly possible.] |

## Support of MRB ID Change on E1/F1

**(2) The change in the E1AP CR in R3-224674 [37] to change the semantics of the E1AP maxnoofMRBs is agreed**

ad (1) the moderator sense the following status

- there is not a common understanding yet on the scenarios where E1/F1 changes would be needed for MRB ID change and whether protocol additions are needed.

- the discussion is dependent on the question whether we should support change of MRB IDs during the lifetime of an F1 MC Context, given the scope of MRB IDs to be an F1 interface instance.

- given the feedback below, there seems to be a common understanding the MRB ID change only affects F1 UE Context signaling. (no UE-associated signalling on E1 containing MRB ID information)

- if the MRB ID provided in inter-gNB HO messages is interpreted as the MRB ID allocated as the value allocated at the source gNB, as proposed to be added in R3-224468 [18], then delta signaling should be possible for such scenarios (see Nokia comment in first round).

- MRB ID allocation and constructing the parts of the RRC Reconfiguration message is performed by the CU, any MRB ID provided on the F1 interface is the current (new) configuration. There shouldn’t be any reason to introduce “new” or “old” MRB IDs on F1.

**Q7: Is it possible to conclude that as long as there is no support of change of MRB IDs during the lifetime of an F1 MC Context necessary, no additional F1/E1 changes are needed?**

The moderator kindly asks to please provide comments below.

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Need to check if the CGconfig built by DU needs the mapping? |
| Huawei | We see companies does not want support the change of MRB ID in MBS associated F1AP/E1AP procedures, as commented above in Q1, about change of MRB ID, the proposal 1 of R3-224672/3 is still needed to support delta configuration:**Proposal 1: in F1AP: UE CONTEXT SETUP REQUEST message, the gNB-CU indicates the source/old MRB ID to the gNB-DU for the new MRB to be setup.**Therefore, for F1AP CR R3-224673, we need to keep the changes for proposal 1.For E1AP, we are ok to update E1AP 4674 to only capture the update of maxnoofMRBs.Please find the updated 4673 and 4674 in the compromise folder. [Ericsson: but the only node that needs to know the “old”/”source” configuration is the CU. the DU doesn’t need to know. at the target side the “new”/”target” configuration is prepared.]* Huawei2: disagree, in order to enable the DU providing delta configuration to the CU for a MRB (new MRB ID A, B, C), CU needs to provide the CellGroupConfig (including old configuration for old MBR ID 1,2,3) and the old(source) MRB ID to the DU, otherwise, how can the DU knows MRB ID and the new MRB ID A is the same MRB? And it can provide delta configuration on the top of MRB ID 1’s configuration?
 |
| ZTE | Agree. MRB ID change happens only during mobility where source and target allocate different MRB ID. In such case, old MRB ID is only used at source and new MRB ID only at target: the change wont happen to an already existing F1AP.* Huawei2: see comments we provided above and in Q1.
 |

## Corrections for shared NG-U termination

**The moderator suggests to close discussions on both topics at RAN3#117-e. This probably needs to be taken to Rel-18.**

### shared address management

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Disagree. The moderator has not proposed a satisfactory response:*We have also assumed that the involved entities would have the possibility to deduce that UP resources have been already established*The MB-SMF receives a unicast address. How can it recognized that it has been already allocated?? If not it will sends signaling to MB-UPF to add this unicast address uselessly!  |
| Ericsson | I am fine with your persistence on this topic and we have never said that our “assumption” provides sufficient argument to not start with respective work urgently and immediately. As a moderator, I sense the urge from Nokia to solve this in Rel-17. We have 2 possibilities: we try to agree on that during this meeting or we agree to put in on the agenda for next meeting as another open item. Fine with both ways. If we want to solve this in Rel-17, we have to agree on LS to SA2, I assume. If we do so, we should bear in mind that we assume an excellent collaboration with SA2 also on other items (not only MBS) ;-) |
|  |  |

### third shared codepoint

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Disagree. The response provided by Samsung is wrong:*Existing two codepoints already consider all the scenarios. E.g. if CP sends bearer setup with codepoint2, And UP sends Failure message. Then CP send another bearer setup with codepoint1, it will achieve the same function/result as new codepoint*If Nokia CU CP sends bearer setup with codepoint 2, the current text mandates Samsung CU UP to allocate the resources: see current text in TS 38.473: *Otherwise (shall) allocate separate resources as requested by the gNB-CU-CP and indicate in the BC BEARER CONTEXT SETUP RESPONSE message**[Samsung Reply] There is no “shall”, CU-CP can not mandate CU-UP to accept its request. We think CU-UP can reject anyway.* *Nokia> sorry, you are wrong: it is obvious that the “shall” applies also to the allocate in this sentence, even if the word is not present before.* "apply requested configuration" the gNB-CU-UP shall make use of an available appropriate Shared NG-U Termination if the radio bearer configuration of the Shared NG-U Termination, is the same as the one requested by the gNB-CU-CP, otherwise allocate separateWhy would Samsung CU UP not allocate resources in that case and send failure? Samsung CU UP is happy to tie the Nokia CU CP with resources. But Nokia CU CP wants to use another CU UP, will have to trigger a release resources to Samsung CU UP before requesting another dedicated CU CP.*[Samsung Reply]The use case has confusion. If CU-CP wants to select another CU-UP, then why CU-CP needs to receive the “available configuration” in the Failure Response?**We assume it is the CU-UP decision to send Response or Failure. If the CU-UP don’t want to use “requested configuration”. The CU-UP can send the Failure without “available”. Then the CU-CP can select a new CU-UP, or decide to send another Request with codepoint 1. Then the CU-UP will use “available” and notify the “available” in the Response message. The only difference between using existing codepoint or codepoint 3 is to send “available” in Response or in Failure message.* *Nokia> that is exactly the problem. CU UP controls everything in what you say above. If CU UP does not want to send failure, it will allocate the resources and CU CP can do nothing about it, except needing to send a “cancel resources”. The point is that CU CP has lost the control it has today. CU CP should be able to select another CU UP independently of the will of the shared CU UP .*  |
| Ericsson | Same as above. We find the codepoint useful and very logic to introduce, also in light of providing a complete set of protocol functions supporting all conceivable “main” scenarios.The same as for 3.8.1: if we agree to have this in Rel-17, and we should be honest that this is not a magic topic to conclude on, then we either have to close it at this meeting or put it as an open item to the agenda. |
| Samsung | Maybe it is more clear to reply Nokia’s questions by inserting my answer in above. Please see above answers marked with [Samsung reply] |

## Corrections for MC MBS session admission control

**The moderator proposes to close the discussions at RAN3#117-e.**

## Correction to Group Paging in F1

**There is general support on enabling Group Paging on F1 w/o UE Identity List for Paging IE included.**

**There is however, like on NG, the open issue on whether it is necessary to enable including DRX information within which all POs should be seized for MC Group Paging.**

**The moderator suggests to take this discussion in CB#20. If there is an F1 specific aspect, we should discuss it in this CB**

**Q10:** please provide your view on the open topic below if there is an F1 specific aspect to be discussed (otherwise we should make a common decision for NG and F1 in CB#20):

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | OK to take it with CB20. |
| Google | Discuss it in CB20. |
| Huawei | Already been considered in CB20, and F1AP CR will be reviewed there as well. |

## Introducing MBS cause values in E1AP and F1AP

**General support for introducing MBS specific cause values on E1 and F1**

**Q11:** Is it acceptable to revise documents R3-224665 [31] - R3-224668 [32] to remove the MBS Area Session ID related cause and then agree on them? please provide your views:

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | OK |
| Huawei | We prefer to support the area session id related cause, the reason is:For the ‘Unknown or inconsistent MBS Area Session ID’ cause in F1AP and E1AP, the MBS Area Session ID is used to setup F1-U tunnel. If receiving the unknown MBS Area Session ID or inconsistent MRB ID for the MBS Session ID, the gNB-CU/DU should response failure message with proper cause value.Although the CRs are updated/revised based on moderator’s suggestion. We would like to hear other companies view on the causes related to area session id, and to make the final decision on whether to take them into account or not for this meeting. |
|  |  |

## DU and CU role for deciding the MRB bearer type applied in the UE RRC configuration

**The moderator thanks for the discussion and proposes to close this topic in RAN3#117-e.**

## Broadcast and Unicast Co-existence correction for F1AP

**The moderator proposes trying to agree on the CR in R3-224333.**

**Q13:** Please provide further comments to R3-224333 [5], the F1AP CR, and provide your view in case you have strong objections to agree on the CR at RAN3#117-e.

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | There is no support for simultaneous scheduling for broadcast and unicast in release 17. We object this CR. |
| Huawei | We support to agree the CR this meeting.To Nokia, if the DU does not know the MII of the UE, how to schedule the UE by the DU properly if the UE have ongoing unicast?  |
| ZTE | in the Handover Preparation Information included in CU to DU RRC info, CU is able to indicate MII info to DU.therefore, such CR might not be needed.* Huawei2: in case there is no mobility, i.e. the UE moves from idle to connected in current serving cell, how can the DU get MII?
 |

## E1AP ASN.1 Correction for MCBearerContextToModify

**R3-224644 will be reported as agreed**

## Exchange of ongoing broadcast service between neighbor nodes

**Given the different views the moderator suggests continuing discussions in Rel-18.**

**Question from CATT:**

In Rel-17,how could the NG-RAN node broadcast the ongoing broadcast service of neighbor cell in Uu interface since it is not static which could not be configured by OAM?

Answer from Ericsson:

We discussed this partly of the reflector. If a node is not able to provide such information, then it does not broadcast it and the UE doesn’t use such “assisting” info. In the nominal case, where for BC resources are available in the whole indicated service Area, each gNB should have sufficient information available that also covers information of the service Area in neighbours, which should enable the gNB to construct this information. What could be looked at in Rel-18 is whether this information should be exchanged over Xn, what kind of info it should be and what means to use.

* Huawei2: in case this is not supported, the gNB will only be able to broadcast the information of neighbor cells within the gNB, or based on the service area received from BC Setup, but it may not accurate, as some BC sessions maybe failed or released in some neighbors cells.

# Discussion first round

## General alignment of definitions, missing definitions, etc.

This topic is dealt with in R3-224467 [17] - R3-224473 [22], including CR for 38.401 [18], CR for XnAP [19], CR for F1AP [20], CR for E1AP [21], CR for 38.472 [22], CR for 37.482 [23].

**Q1:** Given the fact that the content of those documents were submitted to all companies participating in MBS discussions in the past begin of July, the moderator suggests to collect further comments but to assume that these changes are in general agreeable. Please provide your comments below.

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Tdocs agreeable except the following points:1/ Allocation and usage of MRB ID over F1 (see [18]):- F1 interface: an MRB ID signalled on an F1 interface instance identifies uniquely an MRB among all MRB contexts in an gNB-DU, allocated for all active multicast MBS sessions served by that gNB-DU. The value of each MRB ID is the same value as communicated to UEs served by that gNB-DU.There is no need to have such restriction. This can be left open. 2/ Redefinition of the F1-U context descriptor (see all tdocs):We prefer keeping the existing structure which better maps to data forwarding tunnels and UE identification. |
| Samsung | Most corrections are Ok. But for the F1-U context descriptor, if F1-U tunnel is setup per Area session, actually only Area Session ID is enough to distinguish different F1-U tunnel for one MBS session. For the PtP transmission, UE specific identifier is needed. |
| Huawei | 1) For ‘The allocation and usage of MRB ID values on NG-RAN interfaces for multicast/broadcast MBS sessions’ parts:It was intended to limit the MRB ID to per gNB-DU level. While this will result in confusion over the E1 interface, as the CU-UP would misunderstand the same MRB ID but essentially different MRBs. Thus, It is more appropriate to guarantee the MRB ID to gNB level, note that there is no agreements on this. Besides, for deactivation session, whether to allocate F1 tunnel/resources is up to the RAN node implementation. In additional, allocation MRB ID for broadcast session is also up to the RAN node implementation. Thus, we disagree to introduce MRB ID related changes to 38.401.2) For F1-U context descriptor related:We disagree with the change, see the comments in Q3. We’d better to discuss this issue separately. |
| Ericsson | In response to Nokia 1/: this statement is already contained in the IE definition in current F1AP specification and reflects the common understanding we had last meeting, i.e. on the same F1 interface instance the MRB ID is unique among all MC Session Contexts. The only thing this text provides is a central place (we remove the definition in F1AP) where the scope/nature of the MRB ID is specified.In response to Nokia 2/ this needs to be further discussed then, as it seems. The establishment of F1-U tunnels, triggered by the DU, should have all the information needed for transmitting MC data to the DU w/o cell/UE/etc. identifiers.In response to Samsung: The reason behind that was to create an 1:1 association between the MC Session Context and the F1-U context descriptor. If you pull out the Area Session ID, you would have to add it at all places where the F1-U context descriptor is used. So, better to keep this in one place.In response to Huawei 1/ the MRB is not unique on the E1 interface, but that is not necessary, on E1 this is only a reference to be unique per session. The CU-CP can do the mapping. MRB uniqueness on gNB is a bit limiting given the possibility of fairly large gNBs.We have created new versions of the “general” E1 and F1 CRs where the MC F1-U Context descriptor is carved out, see the “compromise” sub-folder |
| CATT | Agree all except the following point *E1 interface: an MRB ID signalled on an E1 interface instance identifies uniquely an MRB among all MRBs allocated for a multicast MBS session.*Here, for MRB ID in E1 interface, different with what it is in F1 interface ,it seems applied to both active MBS session and inactive MBS session.Could we assume that the PDCP resources always be setup no matter the MBS session is active or inactive? |

## Control of F1-U ptp retransmission tunnel resources

This topic is dealt with in R3-224475 [24] and R3-224476 [25].

**Q2:**The moderator proposes to take

(1) agree on CR for F1AP in R3-224476 [25]

(2) agree on the following parts of R3-224407 [8], CR for 38.401: section 6.1.5 and ptp retransmission parts of section 6.4. Please provide your comments below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | DisagreeIt would be good that moderator could split the topic into finer pieces. But overall,1. For us only proposal 2.2-3 is agreeable, not the others.
2. For us 6.1.5 is OK; Section 6.4 NOK because we think that separate tunnels for ptp retransmission and data forwarding is cleaner.
 |
| Huawei | Disagree with (1):* we prefer to let the CU determine the MRB type, and therefore the MRB type reconfiguration from DU to CU is not aggregable.
* Do not see strong need to have a CU triggered Distribution Release/Modification Request. and why in the cover page and the procedural text part the Distribution Modification is introduced, but in the class2 procedure tabular and asn.1 the Distribution Release is introduced?

For (2), basically fine* 6.1.5 is ok
* For 7.7.1, for PTP only MRB, we think both UE specific tunnel and shared tunnel are possible, current wording limit it to only be able to use UE specific tunnel.
* For 6.4, we think a single UE dedicated ptp tunnel to be used for both ptp retransmission and data forwarding is acceptable, although we proposed to use separate tunnels in our paper, but we are fine to compromise on this.
 |
| Ericsson | (1) and (2) are fine for us, and we are open to compromise to also include a “ptp forwarding” (i.e. ptp retransmission w/o PDCP status report) to the possibilities.We do not want to enter into discussion again whether CU would determine the MRB type. I hope we do not have to continue discussions on CU and DU role w.r.t determining lower layer configuration.What we can agree on is that the CU is responsible for configuring the UE with higher layer retransmission schemes which require ptp retransmission resources, but that is different from MRB type, i.e. lower layer decisions to be made by the DU.We have agreed last time to work on ptp retransmission @ MRB type reconfiguration. As the DU decides the MRB type, reconfiguration has to be indicated to the CU for the CU to decide whether higher layer retransmission is preferred by the CU. This is so straight forward, that it shouldn’t require any further discussion and comments above are, sorry to say, off-scope. The possibility to trigger the release of the ptp retransmission tunnel from the CU ends up in a new CU triggered Distribution Release procedure, we discussed this and would prefer not to rely on timer based solutions. |
| CATT | Generally Ok. Two comments on F1AP as below:1) the “MRB type reconfiguration” IE might seem too coarse, the gNB-CU(-CP) may perform differently (e.g. on whether to configure retransmission) for the two cases of bearer type change, e.g. PTM-to-split and split-to-PTM.2) Scenarios on gNB-DU initiated per UE MRB release need more clarification.For DRB, the reason for DU initiated DRB release could be there is no radio resources for this DRB. However, for MRB, if UE has join the session, there seems no reason for DU to release the MRB per UE as long as the MRB exist. Even if the UE is configured with PTP mode only, in case of no enough radio resources ,it could be changed to PTM mode instead of releasing the MRB. |

## Control of F1-U “catch up” tunnel resources, i.e. for ptp F1-U tunnels that provide data forwarded on Xn-U

R3-224327 [1], R3-224328 [2] and R3-224329 [3] propose to allow establishment of ptp F1-U tunnels to deliver PDCP PDUs to the DU as received via the Xn-U forwarding tunnel. Different than the re-structuring of the F1-U Context Descriptor in R3-224471 [20] and R3-224472 [21] it is proposed to keep an explicit UE reference.

**Q3:**The moderator suggest to

(1) first comment on the overall concept, scenario and requirement of this approach

(2) comment to an approach, suggested by the moderator, given (1) can be answered positively, where the F1-U Context descriptor, upon request from the CU, follows approach in in R3-224471 [20] and R3-224472 [21] and includes yet another “discriminator” for this new kind of tunnel e.g. “ptp forwarding tunnel” (with the semantics that no PDCP Status Report is configured) and including the first PDCP SN to be sent on that tunnel and by that allowing a “direct” communication between the DU and the CU-UP) w/o the necessity to “intercept” the F1-U MC Distribution Setup procedure at the CU by retrieving UE context data.

and kindly asks to provide comments below.

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | We support the approach of [1], [2], [3] as a starting point.But we are ok to open discussion on a compromise approach if it can prove to work.It is not clear in the “compromise/new” approach proposed by moderator how the CU UP can make the binding with the UE Xn forwarding tunnel, therefore the approach suggested by moderator is NOT agreeable unless more explanation is given. |
| Huawei | We share the view with Nokia that to use [1], [2], [3] from us as the starting point.about the F1-U Context Descriptor, we prefer to keep the PTP UE reference. And as said above, we are fine to compromise to merge the PTP retransmission tunnel and the PTP catch up and forwarding tunnel. |
| Ericsson | We do not see the need for introducing a new method to for retransmission at all. We do not see what improvement this will achieve. If PDCP Status Report is optional, it does not mean that you have to optimize the case where you do not use it. We don’t see any gain, neither for services that would require seamless mobility (which would require fairly good transmission sync between source and target and retransmission is not an option) nor for lossless (for which you would apply PDCP SR).But if you are searching for a compromise and we can make you happy with introducing this possibility, we are willing to discuss ending up with 3 kinds of ptp tunnels: - ptp transmission- ptp retransmission based on UE feedback (PDCP Status Report)- ptp forwarding of data w/o PDCP Status report on MRB progress information from the source side from, i.e. which PDCP SN onwards to send packets.The compromise would end up effectively in the following F1-U Context Descriptor with the following structure:

|  |  |  |  |
| --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **IE type and reference** | **Semantics description** |
| Multicast F1-U Context Reference | M | 9.3.2.x |  |
| MBS Area Session ID | O | 9.3.1.221 |  |
| MC F1-U Context usage | M | ENUMERATED (ptm,ptp,ptp retransmission,ptp forwarding, …) | "ptm" indicates that the Multicast F1-U Context is setup for ptm transmissions; decided by the DU."ptp" indicates that the Multicast F1-U Context is setup for ptp transmissions; decided by the DU."ptp retransmission" indicates that the Multicast F1-U Context is setup for ptp retransmissions (based on PDCP Status Report); requested by the CU"ptp forwarding" indicates that the Multicast F1-U Context is setup for transmitting from a defined MRB Progress Information status onwards; requested by the CU. |

if “ptp retransmission w/o UE feedback” is chosen, the following info needs to be provided in the same message:

|  |  |  |  |
| --- | --- | --- | --- |
| MRB Progress Information | M | encoded as e.g. on XnAP 9.2.3.147 | Indicates for each indicated MRB the MRB Progress (PDCP SN status) at the source cell. |

It is important to us, that the F1 MC Distribution Setup procedure works basically end-to-end between DU and CU-UP, with the CU-CP acting as a “relay” only. Therefore the suggestion that in case the MC F1-U Context is used for “*PTP forwarding*” the MRB Progress Information is provided from the CU to the DU in UE Context signalling.The CU can request the DU to setup resources for ptp retransmission and ptp forwarding purpose, for the latter one it can add the start PDCP SN (so that the CU doesn’t need to retrieve this info from the UE context in the course of the Distribution Setup procedure)but whether ptp or ptm is used for regular transmission (i.e. transmission not related to MRB type change or mobility), is up to DU to decide and basically transparent to CU-CP (CU-UP acts differently, as specified already in 38.425).We also do not see the necessity to directly associate the forwarding tunnel on Xn-U with the ptp forwarding tunnel on F1-U, because it is sufficient that the CU-UP knows from which PDCP SN onwards it shall start transmitting. The F1-U ptp forwarding tunnel can be release after an implementation specific time (as also ending forwarding on Xn-U ends in an implementation specific way, so no need to optimize.)see also draft revisions of 4476 [25] and 4477 [26] (the MC F1-U Context Descriptor changes were moved from 4471 [20] and 4472 [21] in “compromise” subfolder. |
| Lenovo | Fine with the comprise in principle, need more time to check the revisions e.g. on how the ‘first PDCP SN’ works |
| CATT | We prefer the restructuring in [20].For the compromised option from E///, we could not understand why we need separate the retransmission tunnel into the following two tunnels again. Could you please clarify the benefit comparing with one tunnel?And questions from our side on the new proposal: For the forwarded data, the target NG-RAN node may also send data to UE based on PDCP status, in this case, which tunnel should be used ,i.e. the tunnel for ptp retransmission based on UE feedback (PDCP Status Report) or the tunnel ptp forwarding of data w/o PDCP Status report? |

## Introducing support of MBS Session level Xn-U data forwarding

Papers R3-224449 [15] (discussion) and R3-224450 [16] (XnAP CR) propose to introduce MBS Session level Xn-U data forwarding.

**Q4**: The moderator kindly asks to provide below

(1) general comments on the proposal

(2) comments on the CR, if applicable/if any

|  |  |
| --- | --- |
| Company | Comment |
| ZTE | tend to not. the spirit of current spec assumes if there is no PDCP SN sync (and no MRB mapping sync), then no data forwarding. |
| Nokia | Proposal OK.No reason to exclude this possibility which is simpler when data loss not required. This aligns with what we do for DRB. We assume that it remains optional whether to use this MBS session forwarding tunnel.Answer to ZTE: there is always assumed PDCP SYNC, as we agreed: then if lossless required can use MRB tunnel forwarding, if lossless not required can use MBS session level forwarding. This is flexible and simple. |
| Samsung | Tend to not. I think the forwarded data for UE1 can also be used for UE2 if UE2 handover time is very close as the UE1. It is target node decision whether to configure data forwarding or not based on its existing available data. |
| Huawei | Ok, agree with Nokia.We do not see the reason to exclude this possibility as well. |
| Ericsson | We do not support this option as it is not necessary on top of existing approaches. We do not have to align with DRB but prefer to keep it simple. Just think of the corrections we are still in to define the relation between Session level and RB level forwarding resources. Less functions, less testing, less errors, more simplicity, more stability. |
| Lenovo | Tend to agree with Nokia and Huawe. |
| CATT | NO strong opinion |

## Control of Xn-U forwarding tunnel resources for MC MBS traffic in E1AP

E1AP CRs in R3-224860 [39], R3-224329 [3] and R3-224648 [30] introduce missing E1AP signaling to configure Xn-U forwarding resources towards supporting and non-supporting gNBs (which requires QFI mapping information).

**Q5.1**: The moderator proposes to follow principles outlined in R3-224860 [30} and R3-224329 [3], which rather configures the MC MBS Session Context than a UE Session Context. The moderator suggests to take [R3-224860 [40] as baseline (which include the forwarding and mapping information into the existing “Setup/Modify” List IEs. Please provide your comments below:

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | We overall support this addition.But we support taking R3-224329 [3] instead as baseline which reflects our preferred changes.  |
| Samsung | First the principles are same in these contributions. It is possible to merge.We think the forwarding address, progress information are all per MRB information, it is cleaner to include them into existing MRB list then we can maximum re-use the already defined information element. Otherwise, we need to define extra new IEs which just introduce complexity and reduce the readability of specification. Therefore we agree with moderator’s suggestion. Take the easy version and merge them into one. |
| Huawei | We prefer to do the work based on [3] as it is a full set solution for F1 and E1 together with [2]. |
| Ericsson | we support those additions, as they are clearly missing in E1AP (we do not support the F1-U Context Descriptor parts, which needs to be discussed separately).We build on the hope that the common understanding is that MRB forwarding takes place between a MC UP context in the source CU-UP towards an MC UP context in the target CU-UP.What we like more in 4860 over 4329 is the fact that the forwarding related information is already incorporated in the MRB related List IEs (and not newly created) and that its structure is as simple as possible (e.g. no need to distinguish between source- and target-status-retrieve) but at the same time contains all information necessary. |
| CATT | Acceptable but,As analysed in R3-224647 [29], we think the *MBS Initial HFN and Reference PDCP SN* IE can be reused for indicating the SN status at source. |
|  |  |

**Q5.2**: The moderator also proposes to discuss renaming the *MBS Initial HFN and Reference PDCP SN* IE (E1AP, see [30]) or alternatively modifying the IE semantics bearing in mind, that the value carried in this IE may be only an estimate. Corresponding proposal for XnAP in [40] to be included in the discussion.

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| --- | --- |
| Company | Comment |
| Nokia | For the redefinition of *MBS Initial HFN and Reference PDCP SN* IE, we support [30] which provide more accurate definition than [40] for distinguishing of *oldest PDCP Count* and *Current PDCP Count*. |
| Samsung | [40] doesn’t change the Initial HFN and reference PDCP SN. It deals with another IE: MBS progress information which including the PDCP SN. Currently the MBS progress IE is included in HO Request and HO Request Ack message. We have different descriptions for the same IE in two procedures. We think it is not necessary to have different descriptions. We can use the commonly used description. To avoid bring the confusion to the future implementation.For the name of *MBS Initial HFN and Reference PDCP SN* IE, we prefer to keep as it is. Since this is also being used in RRC specification.  |
| Huawei | It is ok for the update in [30] on the redefinition of *MBS Initial HFN and Reference PDCP SN* IE.Disagree with the change in [40], as it was intended to use different semantics descriptions for the source side and the target side, for the source side, the information has to be the last packet transmitted/delivered to the UE, but the information from target should be the oldest available packets information. |
| Ericsson | Though trying hard, I didn’t really understand the details of this proposals. |
| Lenovo | The update in [30] on *MBS Initial HFN and Reference PDCP SN* IE is not correct. We disagree with the change. |
| CATT | Support the redefinition of *MBS Initial HFN and Reference PDCP SN* IE in [30]We would like to clarify our intention:Currently, the value of the “multicastHFN-AndRefSN” field in the RRCReconfiguration message is coded by the gNB-CU-UP. This is not suitable in our understanding: technically speaking the gNB-CU-CP has the right to adjust the count value due to various reason, such as taking the CP delay into consideration, setting the count lower to make the UE receive more packets, or setting the count higher to avoid any waiting in UE due to PDCP reordering (which finally results in UP delay).A much better approach is to make the gNB-CU-UP provide its current count, i.e. the state variable “TX\_NEXT” defined in §7.1 in TS 38.323 |

**Q5.3**: The moderator also proposes to discuss changes proposed in [30] regarding PDCP SN wrap around. Please provide your comments:

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| --- | --- |
| Company | Comment |
| Nokia | We disagree with this change.To our knowledge this was left as implementation matter in RAN2. |
| Samsung | It is more suitable to discuss it in RAN2 first. |
| Huawei | Similar with as Nokia. |
| Ericsson | no strong view |
| Lenovo | It is more suitable to discuss it in RAN2 first. |
| CATT | We propose this and support to introduce it .It is discussed in RAN2 and was regarded as network implementation from RAN2 point of view. However, it impacts the behaviour of both the gNB-CU-CP and the gNB-CU-UP so change on E1AP is necessary. Detail analysis can be seen in R3-224647 [29]. |

**Q5.4**: And finally, sorry for that, the moderator proposes to discuss proposals regarding provision of mapping information to support duplication avoidance, as proposed in [30]. Please provide your comments:

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| --- | --- |
| Company | Comment |
| Nokia | Proposal seems OK. |
| Samsung | In general we are fine to support the duplication avoidance. The real change can be reviewed in second round. Existing many issues are included and maybe we could include different aspect in different document for review. |
| Huawei | No.Considering the possibility that the CU-UP served for MBS session may not be the same CU-UP serves the UE’s PDU session, therefore we proposed in [1] [2] [3] to use MBS related procedures (non UE associated) procedures to achieve the data forwarding aspects, and the mapping relation ship has already been considered there. |
| Ericsson | Really like to read Huawei’s comment. This is exactly the point. |
| Lenovo | Same view with Huawei. |
| CATT | With the comments from Huawei,we are OK to use MBS related procedure. |

## Re-structuring TS 38.401 message flow for multicast

There are a couple of attempts to either correct the current version of the mc message flow in TS 38.401 in its current shape as in R3-224334 [6] or to disentangle the flow and split it up into different stages/scenarios as shown in R3-224477 [26].

**Q6:** The moderator suggests to

(1) follow the approach in R3-224477 [26] and discuss it

(2) then discuss whether and how to introduce further details as suggested in R3-224334 [6] and R3-224933 [42] and R3-224943/5040 [44].

and kindly asks to provide comments below:

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| --- | --- |
| Company | Comment |
| ZTE | Related to Q9. Please kindly have a look of our paper in [43] to tackle - the mysterious admission control for a multicast flow in PDU session that shall not happen in the first place, and- unnecessary radio resources allocated for an inactive session.Therefore a re-structuring is definitely needed.And in [43] we suggested a look at the message flow for F1AP. We are aware that it might be too late to take it back. But if we take a holistic view of F1AP, one may easily find that we could have a better version of F1AP for multicast. - it takes 3 kinds of signaling to sync multicast context between CU and DU.- during session activation, the overhead is doubled or tripled.- why can not we go the CU initiated multicast context setup request way, old but good? // I fail to see our way to follow NGAP on F1AP. MB-SMF needs gNB to shout out to let MB-SMF find it, while a CU can always find its DU! |
| Nokia | We support and cosign R3-224334 but we are also OK to take the approach of the moderator for disentangle the flows in R3-224477. However, we can only agree the two first figures, we disagree with the third one depicting the MRB Type change triggered by DU which is not agreed.  |
| Samsung | Agree. Also have concern on the third figure.  |
| Huawei | First, we support [6] as we should setup shared NG-U tunnel before establish the context for F1AP, as the RAN node only be able to know the session status in the NGAP distribution setup response. |
| Google | OK to start with R3-224477. For the steps 4/5 for the first part, we wonder if the UE context modification procedure should be moved to the second part where the per UE RRC configuration (i.e., before/at step 8) would take place. In addition, it can be discussed later how gNB-CU-CP obtains the QoS parameters before the E1AP MC Bearer Context Setup as raised 4919/4933. |
| Ericsson | as an intermediate status, the moderator senses support for “disentangling” the message flows in 38.401 as proposed in [26].Nevertheless, there is an attempt made to at least show how ptp retransmission and ptp forwarding F1-U tunnels are established, see “compromise” subfolder. |
| CATT | We also co-sign R3-224334,but we are also fine to have separate flowchart for different case as proposed in R3-224477. However,there is one issue raised by ZTE which needs further discussion .i.e. whether CU-UP could allocated reasource for the MRBs which are mapped by flows in an inactive MBS session? |

## Support of MRB ID Change on E1/F1

R3-224672 [35] (discussion), R3-224673 [36] (CR F1AP) and R3-224674 [37] (CR E1AP).

**Q7:** (1) The moderator understands that MRB ID change in case of inter-DU mobility is covered, while these papers propose to support MRB ID Change in case of intra-DU mobility. If this is confirmed, the moderator wonders whether this is necessary, as the scope of the MRB ID was defined to be the DU (an F1 interface instance) and we could assume that the MRB ID allocation does not need to be changed.

(2) The E1AP CR also proposes to change the semantics of the E1AP maxnoofMRBs.

The moderator kindly asks to please provide comments below.

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| --- | --- |
| Company | Comment |
| ZTE | Anyone had considered having a **MRB index** per CU/DU pair, together with a per UE **MRB ID**, to help clear the mess on how MRB is managed on F1AP? [43] R3-224942 |
| Nokia | 1. We understand the need to provide the old MRB ID in UE-associated messages for the delta configuration, assuming that it is not provided over RRC inter-node messages (to be checked). But we don’t see the need for the non-UE associated change of MRB ID as we don’t see the use case.
2. Seems OK.
 |
| Samsung | 1) RAN2 agreed to support delta for loss-less HO. I think it is only possible for RLC-AM with PtP transmission. The mechanism is similar with unicast. Seems no need to introduce change to E1 and F1. Maybe more time to check.2) is ok |
| Huawei | Both ok.To ZTE, we do not prefer to have a MRB index…. |
| Ericsson | (1) - also we think that introducing an MRB index is not necessary.- what the moderator tried to explain is that we should have covered all cases with current signalling. what is needed is the stage 2 definition that an MRB ID provided at HO refers to the value assigned at the source side (this to add one more thought on top of Nokia’s understanding, which we share.)- to Samsung: this is independent from the MRB type used.(2) is ok |
| Lenovo | 1. OK. To Samsung, the delta configuration is not only for ptp transmission. To support delta configuration, the old MRB ID is necessary. For providing old MRB ID in non-UE associated signalling is not so essential. But for UE associated signalling, it is necessary.
2. OK
 |
| CATT | (1) Agree for the UE-associated part. The inter-node message includes only the old MRB ID but not the new one so the gNB-DU cannot get the mapping from any inter-node message. Disagree with the non-UE-associated part.(2) Agree. |

## Corrections for shared NG-U termination

**Q8.1:** Documents R3-224442 [10] - R3-224444 [12] propose to correct the handling of shared NG-U terminations on E1 and NG to explicate the case where F1/NG Distribution Setup procedure instances refer to already established NG-U terminations. Please provide your comments below,

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| --- | --- |
| Company | Comment |
| Nokia | Proposal is OK.There are two solutions proposed: the “implicit” indication by omission of address would erroneously be interpreted as per current SA2 and RAN3 specification that multicast transport is used which makes confusion between RAN and CN. We prefer explicit IE so that it is unambiguous for CU CP and MB-SMF that a “shared address” has been used and therefore it doesn’t need to be again requested to be added to the distribution tree.  |
| Samsung | Isn’t it an enhancement function and change the MB-SMF behavior? Could it be discuss in Rel-18? |
| Huawei | In common CU-UP scenario, if the UP provides available MC MRB Configuration, the CU-CP should be able to know that there is available shared NG-U termination, and then it can decide to not trigger the establishment of the shared NG-U, right? Or if the CU-UP send the same DL TNL address to this second CU-CP, the CP try to establish the NG-U tunnel using the same address, seems also nothing broken… |
| Ericsson | Just to be on the safe side for terminology: at: there is no such thing as “common CU-UP” owned by different gNBs. We are talking about “shared NG-U termination”, the term was introduced to keep the concept of logical architecture/nodes consistent.We have also assumed that the involved entities would have the possibility to deduce that UP resources have been already established. |
| Lenovo | Both solutions seem workable. Maybe we can check with SA2 or CT4 first. |
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**Q8.2:** R3-224447 [13] and R3-224448 [14] suggest introducing a third codepoint to allow a combination of the first two codepoints in one step. Please provide your comments below.

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| --- | --- |
| Company | Comment |
| Nokia | Proposal is OK. The proposal avoids useless reservation of resources when second and following CU CP(s) decide to not use the shared CU UP after contacting it, because this shared CU UP doesn’t have the requested configuration as available. |
| Samsung | Introduce more codepoint will introduce more confusion and risk or IOT issue. Existing two codepoints already consider all the scenarios. E.g. if CP sends bearer setup with codepoint2, And UP sends Failure message. Then CP send another bearer setup with codepoint1, it will achieve the same function/result as new codepoint.  |
| Ericsson | we co-signed and supported this at last meeting as well. |
| Lenovo | We share the same view with Samsung. |

## Corrections for MC MBS session admission control

R3-224942 [43] and R3-224943 [44] deals with admission control in general.

**Q9:** The moderator would like to take these papers to highlight that the RAN3 decision that admission control [for MRB radio resources] takes place at multicast session activation is not captured anywhere in stage 2/3. The moderator proposes to task the authors of [43] and [44] to capture that agreement in an appropriate place in 38.401 (as a first proposal). Please provide your comments below.

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| --- | --- |
| Company | Comment |
| ZTE | Proponent of [43] and [44] here.Per SA2 guidance, no radio resource shall be allocated for inactive multicast session. - current flowchart is obviously against such principle. the E1AP procedure will inevitably ask for establishing at least one MRB at UP side, which means it is not only about NG-U but real resources allocated for the radio bearer which is part of the radio resources.Re-structuring the 401 flowchart, confirming the PDU session modification immediately without admission control, is also a more consistent way. As per RAN3 agreement, the multicast flow in the PDU session will not consume any resources.This is, again, consistent with the agreement mentioned by moderator: admission control [for MRB radio resources] takes place at multicast session activation. If the session status is unknown to RAN, how can RAN allocate any resources for it? |
| Nokia | Proposal NOK. These papers seem to introduce significant changes to the specification which is too late. Suggestion: Peharps a clarification, if needed, can be taken with the moderator’s approach of 3.6? |
| Samsung | It seems too much changes to the figure in TS38.401. Could discuss it with other 401 CRs together. We prefer to keep existing agreed principle and no big changes. |
| Huawei | Disagree.For inactive session, the shared NG-U tunnel will still be established, and the F1 tunnel/resources setup or not is up to the RAN node implementation. |
| Google | The proposed message flows are quite different from the existing one but somehow the MBS QoS Flow Level QoS Parameters issue can be resolved by the proposal for the E1/F1 multicast context setup. |
| Ericsson | Not ok, there seem to be a fundamental misunderstanding. PDU and MBS Session Resources utilize different resources and admission control is done on a per session basis, but separately.  |
| Lenovo | Agree as we co-signed the paper. |
| CATT | Maybe we should first discuss whether it is allowed for CU-UP to allocate resources for the MRB in case the MBS session is inactive.After there is conclusion,then we coukd further consider how to update the spec. |
|  |  |

## Correction to Group Paging in F1

**Q10:** R3-224669 (discussion paper in the other CB) and F1AP CR in R3-224671 [34] propose to specify the DU action in case the *UE Identity List for Paging* IE is not included. Please provide your comments below:

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| --- | --- |
| Company | Comment |
| Nokia | Proposal OK.We support the proposal. This aspect (option) is currently not covered. |
| Samsung | Also discussed CB #20. Same comment as CB 20. It is not sure if all the UEs support default DRX cycle. |
| Huawei | Ok, this aspect is missing in the specs so far.The RAN will try to page the UEs at least in all POs in one default paging cycle, therefore there is no need to limit to use default DRX cycle by the UE.Note that the UE shall use the shortest values of the value configured by RRC (if present) and the default DRX value. Thus, to page all involved UEs, the RAN can paging in at least all POs in one default paging cycle. |
| Google | OK |
| Ericsson | overlapping with CB#20, right, and we propose to re-think this approach following Samsung’s comment. |
| Lenovo | OK |
| CATT | Already covered in another CB |

## Introducing MBS cause values in E1AP and F1AP

**Q11:** Documents R3-224665 [31] - R3-224668 [32] propose including MBS specific cause values. Please provide your comments below:

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| --- | --- |
| Company | Comment |
| Nokia | In general OK but we wonder if all these cause values are needed. |
| Samsung | Same topic is discussed in CB #20. In general fine to add the cause value for MBS. |
| Huawei | Ok. |
| Ericsson | same comments as in CB#20, i.e. Unknown or inconsistent MBS Area Session ID is not necessary.  |
| Lenovo | OK |
|  |  |

## DU and CU role for deciding the MRB bearer type applied in the UE RRC configuration

The moderator saw that there are a couple of papers (R3-224332 [4], R3-224406 [7], ff) that contain proposals that the CU ultimately determines the MRB bearer type, which on the one hand side may come from confusing the fact that the CU terminates the RRC protocol, while the DU provides, per Rel-15 agreement the lower layer configuration which is transparently incorporated in the final RRC Reconfiguration message, and partly from the fact that the CU would request the DU to setup e.g. ptp retransmission resources, however, the DU still remains in charge of determining the MRB bearer type, as it denotes lower layer configuration.

**Q12:** The moderator suggests to close the discussion with the above understanding and tasks the author of R3-224407 [8] to provide a resulting CR for TS 38.401 capturing that understanding in chapter 7.7.1 or any other suitable place. Please provide your comments below

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| --- | --- |
| Company | Comment |
| ZTE | [4] R3-224332 had a good summary of the options on the table. We'd like to suggest a compromised solution for everyone:- CU to decide RLC mode, as in legacy.- DU to decide MRB type, in NR MBS.We agree with Ericsson that lower layer config shall be determined by DU. One example, how can CU decide which cell to do the PTM transmission? We doubt it is CU's duty or CU has the capability to do so.Moever, if DU is able to decide which leg to use for a split MRB, DU shall naturally know which MRB type is good for the UE. |
| Nokia | We disagree.In our view the CU is the node deciding the MRB type. Answer to ZTE: the dynamic switch between ptp and ptm leg decided by DU is different than MRB Type. First CU decide MRB Type, and only if CU decides split MRB is needed, then DU can toggle between the RLC legs. |
| Samsung | We agree with Nokia. |
| Huawei | Agree with Nokia |
| Google | Agree with Nokia |
| Ericsson | shouldn’t have started that, sorry.still believe/hope we mean the same thing, but have different languages that still need to adopt:My proposal for convergence of thoughts:(1) DU == lower layer configuration decision, CU== higher layer, provision of RCL mode is only used for DC to match both DC legs wrt RLC mode(2) DU decides whether UE is served in ptp/ptm/split, but CU can request resources for retransmission (as discussed in the other CB).so, in a way, you can say that the CU is given the decision role for retransmissions tunnels to be set up, but for “regular” transmission, i.e. ptp/ptm/split is the DU to decide the MRB type.Is the moderator allowed to put this in the agreement section? |
| Lenovo | We agree with Nokia.As the author of R3-224407, we are fine to capture the agreement in 38.401 if any agreements can be achieved. Anyway, we need down selection one of the two solutions. |
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## Broadcast and Unicast Co-existence correction for F1AP

**Q13:** Please provide comments to R3-224333 [5], the F1AP CR.

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| Company | Comment |
| ZTE | OK with the CR. DU shall be aware of the UE interests for better scheduling. |
| Nokia | Proposal NOK.As far as we know, the simultaneous scheduling of broadcast and unicast is currently being discussed as part of release 18 in other Working Groups. It has no standards impact in release 17. We consistently propose to postpone this to release 18. |
| Samsung | No for now.  |
| Huawei | Ok for the CR.This issue exists for Rel-17. In Rel-18, we may discuss other parameters on the top, but for Rel-17, the DU needs to get the MII of the UE. |
| Ericsson | this requires probably more discussions, thought so far this only has impact on Xn. |
| Lenovo | OK, the DU needs to know MII info for scheduling |
| CATT | OK with the CR |

## E1AP ASN.1 Correction for MCBearerContextToModify

**Q14**: Please provide comments to R3-224644 [27].

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| Company | Comment |
| Nokia | Proposal OK.We need to correct the mistake. |
| Samsung | Ok |
| Huawei | Yes, we co-signed this one. |
| Ericsson | OK |
| Lenovo | OK |
| CATT | OK |

## Exchange of ongoing broadcast service between neighbor nodes

**Q15**: Please provide comments to R3-224645 [28].

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| Company | Comment |
| ZTE | If we remember correctly, we stopped the discussion on this feature meetings ago. |
| Nokia | Proposal OK.We think it is an oversight of previous meeting. Indeed, RAN2 decided corresponding change over MCCH i.e. the list of ongoing services available in neighbour cell will be broadcast over the MCCH of serving cell. Therefore, we need to add this to enable this RAN2 feature. |
| Samsung | No strong view, we have failure procedure for Session Start. So exchanging ongoing broadcast service makes the MCCH information more accurate than just deducing ongoing service from the MBS service area information. While impact to Xn and no-Xn case is also worth noting. |
| Huawei | ok |
| Ericsson | ok to discuss this, but I thought we had the common understanding to leave this out of Rel-17. |
| Lenovo | Frequent exchange on-going broadcast info is not good idea. But we have on strong view to object the CR. |
| CATT | Support.If we leave it out of Rel-17, then broadcast of ongoing broadcast service in neighbor cell could not be supported. We have to inform RAN2 on that. |

# Conclusion, Recommendations [if needed]

If needed

# References

1. R3-224327 Consideration on Multicast Data Forwarding and F1-U Tunnel aspects (Huawei, CBN, China Unicom, Nokia, Nokia Shanghai Bell), discussion
2. R3-224328 Multicast Data Forwarding and F1-U tunnel aspects (Huawei, CBN, China Unicom, Nokia, Nokia Shanghai Bell), CR0977r, TS 38.473 v17.1.0, Rel-17, Cat. F
3. R3-224329 Multicast Data Forwarding and F1-U tunnel aspects (Huawei, CBN, China Unicom, Nokia, Nokia Shanghai Bell),CR0028r, TS 37.483 v17.1.0, Rel-17, Cat. F
4. R3-224332 Other leftover issues on F1 and E1 for MBS (Huawei, CBN, Qualcomm Incorporated, Lenovo), discussion
5. R3-224333 Correction on Broadcast and Unicast co-existence (Huawei, CBN, Qualcomm Incorporated, CATT, Lenovo), CR0978r, TS 38.473 v17.1.0, Rel-17, Cat. F
6. R3-224334 Correction on Multicast Session Establishment (Huawei, CBN, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, CATT, Lenovo), CR0240r, TS 38.401 v17.1.1, Rel-17, Cat. F
7. R3-224406 F1-U tunnels related issues (Lenovo), discussion
8. R3-224407 Correction on F1-U tunnels for multicast MRB (Lenovo), CR0243r, TS 38.401 v17.1.0, Rel-17, Cat. F
9. R3-224408 Correction on F1-U tunnels for multicast MRB (Lenovo), CR0983r, TS 38.473 v17.1.0, Rel-17, Cat. F
10. R3-224442 Correction of address management for shared CU UP (Nokia, Nokia Shanghai Bell, Qualcomm Incorporated, Orange), discussion
11. R3-224443 Correction of address management for shared CU UP (Nokia, Nokia Shanghai Bell, Qualcomm Incorporated, Orange), CR0862r, TS 38.413 v17.1.1, Rel-17, Cat. F
12. R3-224444 Correction of address management for shared CU UP (Nokia, Nokia Shanghai Bell, Qualcomm Incorporated, Orange), CR0029r, TS 37.483 v17.1.0, Rel-17, Cat. F
13. R3-224447 Correction of shared CU UP codepoints (Nokia, Nokia Shanghai Bell, Ericsson, Orange), discussion
14. R3-224448 Correction of shared CU UP codepoints (Nokia, Nokia Shanghai Bell, Ericsson, Orange), CR0030r, TS 37.483 v17.1.0, Rel-17, Cat. F
15. R3-224449 Correction of MBS data forwarding (Nokia, Nokia Shanghai Bell, Huawei, Orange), discussion
16. R3-224450 Correction of MBS data forwarding (Nokia, Nokia Shanghai Bell, Huawei, Orange), CR0863r, TS 38.423 v17.1.0, Rel-17, Cat. F
17. R3-224467 General open issues - discussion (Ericsson, Qualcomm, Verizon Wireless, AT&T, China Unicom), discussion
18. R3-224468 Further Corrections for NR MBS (Ericsson, Qualcomm, Verizon Wireless, AT&T, China Unicom), CR0244r, TS 38.401 v17.1.1, Rel-17, Cat. F
19. R3-224470 Further Corrections for NR MBS (Ericsson, Nokia, Nokia Shanghai Bell, Qualcomm, Verizon Wireless, AT&T, China Unicom), CR0867r, TS 38.423 v17.1.0, Rel-17, Cat. F
20. R3-224471 Further Corrections for NR MBS (Ericsson, Nokia, Nokia Shanghai Bell, Qualcomm, Verizon Wireless, AT&T, China Unicom), CR0984r, TS 38.473 v17.1.0, Rel-17, Cat. F
21. R3-224472 Further Corrections for NR MBS (Ericsson, Nokia, Nokia Shanghai Bell, Qualcomm, Verizon Wireless, AT&T, China Unicom), CR0031r, TS 37.483 v17.1.0, Rel-17, Cat. F
22. R3-224473 Corrections for MBS-associated signalling (Ericsson, Nokia, Nokia Shanghai Bell, Qualcomm, CATT, Verizon Wireless, AT&T, China Unicom), CR0022r, TS 38.472 v17.0.0, Rel-17, Cat. F
23. R3-224474 Corrections for MBS-associated signalling (Ericsson, Nokia, Nokia Shanghai Bell, Qualcomm, CATT, Verizon Wireless, AT&T, China Unicom), CR0002r, TS 37.482 v17.1.0, Rel-17, Cat. F
24. R3-224475 Corrections for ptp retransmission topics and overall example message flow restructuring (Ericsson, Verizon Wireless, AT&T, China Unicom), discussion
25. R3-224476 Corrections for the establishment of F1-U ptp retransmission tunnels (Ericsson, Verizon Wireless, AT&T, China Unicom), CR0985r, TS 38.473 v17.1.0, Rel-17, Cat. F
26. R3-224477 Corrections to the example message flow for multicast MBS Context establishmen (Ericsson, Verizon Wireless, AT&T, China Unicom), CR0245r, TS 38.401 v17.1.1, Rel-17, Cat. F
27. R3-224644 E1AP ASN.1 correction on MCBearerContextToModify (CATT,Nokia, Nokia Shanghai Bell,Huawei,ZTE,Ericsson,Samsung,Lenovo), CR0032r, TS 37.483 v17.1.0, Rel-17, Cat. F
28. R3-224645 Introduction of ongoing broadcast service in XnAP (CATT,Nokia, Nokia Shanghai Bell), CR0878r, TS 38.423 v17.1.0, Rel-17, Cat. F
29. R3-224647 Discussion on three issues on E1AP (CATT), discussion
30. R3-224648 Correction on three issues on TS 37.483 (CATT), CR0033r, TS 37.483 v17.1.0, Rel-17, Cat. F
31. R3-224665 Introduction of MBS specific cause values (Huawei, CBN, Qualcomm Incorporated), discussion
32. R3-224667 Introduction of MBS specific cause values (Huawei, CBN, Qualcomm Incorporated), CR1000r, TS 38.473 v17.1.0, Rel-17, Cat. F
33. R3-224668 Introduction of MBS specific cause values (Huawei, CBN, Qualcomm Incorporated), CR0034r, TS 37.483 v17.1.0, Rel-17, Cat. F
34. R3-224671 Correction on Multicast Group Paging (Huawei, CBN, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Lenovo), CR1001r, TS 38.473 v17.1.0, Rel-17, Cat. F
35. R3-224672 Multicast MRB ID change over F1 and E1 interfaces (Huawei, CBN, Qualcomm Incorporated, Lenovo), discussion
36. R3-224673 Correction on MRB ID Change (Huawei, CBN, Qualcomm Incorporated, Lenovo), CR1002r, TS 38.473 v17.1.0, Rel-17, Cat. F
37. R3-224674 Correction on MRB ID Change (Huawei, CBN, Qualcomm Incorporated, Lenovo), CR0035r, TS 37.483 v17.1.0, Rel-17, Cat. F
38. R3-224859 Discussion for the MBS open issues (Samsung), discussion
39. R3-224860 Correction for the MBS multicast data forwarding (Samsung), CR0037r, TS 37.483 v17.1.0, Rel-17, Cat. F
40. R3-224861 Correction for the MRB progress information (Samsung), CR0892r, TS 38.423 v17.1.0, Rel-17, Cat. F
41. R3-224919 Discussion on Multicast MBS Session Context Establishment (Google Inc.), discussion
42. R3-224933 Clarification to Multicast MBS Session Context Establishment (Google Inc.), CR0254r, TS 38.401 v17.1.1, Rel-17, Cat. F
43. R3-224942 Issues found in Rel-17 NR MBS with discussions and draft CR to F1AP (ZTE), other
44. R3-224943 (will be revised in R3-225040) Correction to 38.401 on admission control of multicast session for NR MBS (ZTE, CMCC, Lenovo), CR0256r, TS 38.401 v17.1.1, Rel-17, Cat. F