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

[to be added]

# Discussion second round 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.

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

## 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 R3-22444477) [NOTE: the first 2 flows are part of Q6 below]

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

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

## 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?

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

## 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.

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

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

## 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]?**

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

## 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 |
|  |  |
|  |  |
|  |  |

## 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.**

## 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 |
|  |  |
|  |  |
|  |  |

## 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 |
|  |  |
|  |  |
|  |  |

## 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 |
|  |  |
|  |  |
|  |  |

## 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.**

# 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.

|  |  |
| --- | --- |
| 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:

|  |  |
| --- | --- |
| 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:

|  |  |
| --- | --- |
| 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:

|  |  |
| --- | --- |
| 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.

|  |  |
| --- | --- |
| 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,

|  |  |
| --- | --- |
| 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. |
|  |  |

**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.

|  |  |
| --- | --- |
| 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.

|  |  |
| --- | --- |
| 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:

|  |  |
| --- | --- |
| 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:

|  |  |
| --- | --- |
| 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

|  |  |
| --- | --- |
| 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. |
|  |  |

## Broadcast and Unicast Co-existence correction for F1AP

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

|  |  |
| --- | --- |
| 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].

|  |  |
| --- | --- |
| 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].

|  |  |
| --- | --- |
| 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