3GPP TSG-RAN WG2 Meeting #121bis-e R2-230xxxx

Elbonia, 17 – 26 April 2023

**Agenda item: 6.2.1**

**Source: Nokia (Rapporteur)**

**Title: [AT121bis-e][602][MBS-R17] Stage-2 and UP issues (Nokia)**

**WID/SID: WI\_CODE - Release XX**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT121bis-e][602][MBS-R17] Stage-2 and UP issues (Nokia)

      Scope: Review Tdocs/CRs submitted to 6.2.1 and 6.2.3, identify agreeable proposals and CRs for approval.

      Outcome:

* Phase 1: Summary with proposals
* Phase 2: Updated summary and proposals, if needed, (updated) CRs
* Phase 3: CRs ready for approval

      Deadline:

* Phase 1: Deadline for comments: W1 Thursday 0800 UTC
* Phase 2: Deadline for comments: W2 Tuesday 0500 UTC (report available for CB session, if needed)
* Phase 3: Agreeable CRs available EOM

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

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| --- | --- | --- |
| Company | Name | Email Address |
| Nokia (Rapporteur) | Subin Narayanan | subin.narayanan@nokia.com |
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# Stage-2

Following papers were submitted to RAN2 in 6.2.1:

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| [**R2-2302406**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302406.zip) | Reply LS on SPS configuration for unicast and multicast (R1- 2302209; contact: ASUSTek) | RAN1 |  |  |
| [**R2-2303126**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303126.zip) | General MBS CR to 38.300 | Nokia, Nokia Shanghai Bell | [**38.300**](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3191) | 17.4.0 |
| [R2-2304154](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304154.zip) | Clarifications for MBS broadcast service continuity | Ericsson | [**38.300**](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3191) | 17.4.0 |

There are paper on the R2-2302406 in the 6.2.2 and those will be treated in the another C-plane focused email discussion.

## General MBS CR (mostly editorial)

In R2-2303126 first change is claiming reason for change as:

1. Using semi-comma is misleading in 16.10.2: Intention in our understanding is to say: not allow MBS "configuration in SCG, rather MBS including multicast and broadcast can only be configured via MCG. It can be received in SCG though (note that SCG herein refers to Carrier Aggregation, i.e., dual connectivity SCell is not allowed).

and the corresponding change is very small:

1. Clearly separate MBS broadcast on SCG from MBS multicast in the description of network architecture

### 16.10.2 Network Architecture

The overall NG-RAN architecture specified in clause 4 applies for NR MBS. MBS multicast can only be supported in MCG side in NE-DC and NR-DC scenarios, i.e., only for MN-terminated MCG MRB. The configuration of MBS broadcast on SCG is not supported for the UE.

The QoS model for NR MBS can be found in TS 23.247 [45].

Rapporteur view: Although change looks editorial one might misread that multicast and broadcast support on SCG are somehow dependant on each other.

**Question 1**: Do you think it is beneficial to have above change? And please provide any arguments one way or other.

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| Answers to Question 1 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | No strong view | The wording looks clear to us either way. |
| Qualcomm | No | Looks clear already. |
| MediaTek | No strong view |  |
| NEC | No strong view |  |
| Lenovo | No strong view |  |
| Sharp | No | We think current wording looks clear to us. |
| CATT | No |  |
| Ericsson | No strong view |  |
| vivo | No | We fail to see the motivation for changing the existing text. |
| LGE | No | Looks clear already. |
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**Summary 1**: TBD.

**Proposal 1**: TBD.

In the same paper another reason for change:

1. Usage of MBS supporting and multicast supporting are not consistent and misleading.-

and corresponding change:

1. Clearly separate MBS supporting to Multicast supporting when talking about multicast feature.

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##### 16.10.5.3.3 Handover between Multicast-supporting cell and Multicast non-supporting cell

During an MBS multicast session, at mobility from an multicast-supporting cell to an non-supporting cell, the target gNB sets up PDU Session Resources mapped to the MBS multicast session. The 5GC infers from the absence of an "MBS-support" indication from gNB in the Path Switch Request message (Xn handover) or Handover Request Acknowledge message (NG handover) that MBS multicast data packets delivery has to be switched to 5GC individual MBS traffic delivery as specified in TS 23.247 [45]. If data forwarding is applied, the source gNB infers from the handover preparation response message that the target gNB does not support MBS and changes the QFI(s) in the forwarded packets to the associated PDU Session QFI(s) if respective mapping information is available. The source gNB may be aware that the target gNB is non-multicast supporting already before Handover Preparation.

For mobility from MBS non-supporting cell to MBS-supporting cell, the existing Xn/NG handover procedures apply. The 5GC infers from the presence of the "MBS-support" indicator from gNB in the Path Switch Request message (Xn handover) or in the Handover Request Acknowledge message (NG handover) that MBS multicast data packets delivery can be switched from 5GC Individual MBS traffic delivery to 5GC Shared MBS traffic delivery. After Xn handover, the SMF triggers switching MBS multicast data packets delivery from 5GC Individual to 5GC Shared MBS traffic delivery by providing MBS Session IDs joined by the UE to the target gNB by means of the PDU Session Resource Modification procedure. For NG handover, the SMF provides the MBS Session IDs joined by the UE to the target gNB by means of NGAP Handover Request. Minimization of data loss and duplication avoidance may be applied by means of identical MBS QFI SNs received over the shared NG-U tunnel against those received over unicast NG-U tunnels or forwarding tunnels.

Mobility from a multicast-supporting cell to a non-supporting cell can be achieved by switching the MRB to a DRB in the source gNB before a handover.

Rapporteur view: This can be considered as editorial change but it seems to make it clearer which part of MBS support stage-2 is referring to.

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**Question 2:** Do you think it is beneficial to have above change? And please provide any arguments one way or other.?

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Maybe not | It shouldn’t be misleading as this is all under the section of “multicast handling” and the related descriptions are about multicast all along.  Note that there is already “MBS-support” indication in above abstracted paragraphs. Besides, RAN3 and SA2 specs use “MBS” in numerous places. If we do this correction, there will be a butterfly effect. |
| Qualcomm | Non-essential | These are mostly editorial changes. Maybe a beautification CR by spec rapp could do these, but hard to justify a separate MBS-specific CR after almost after a year of release freeze. |
| MediaTek | No | Agree with Huawei that “MBS-support” is already used widely |
| NEC | Comment | We are fine to either way (i.e., MBS or multicast) as this is under the section of multicast, but in the paragraphs, both MBS supporting and multicast supporting (last paragraph) are used, this at least should be alignment. |
| Lenovo | No strong view |  |
| Sharp |  | The wording should be aligned in this section and either MBS-supporting or multicast-supporting is fine for us. |
| CATT | No | Same view as Huawei. |
| Ericsson | Comment | Same view as NEC and Sharp |
| vivo | No | The existing wordings are correct as explained by Huawei. We fail to see the motivation for changing the existing text. |
| LGE | No | As Huawei pointed out, the text is about handling MBS multicast session. There was no confusion. Those changes to make the text clear is not needed. |
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**Summary 2**: TBD.

**Proposal 2**: TBD.

There are also some change in the CR that are not highlighted in the cover sheet – purely editorial e.g. If you have any comments on those (highlighted yellow below)

##### 16.10.5.3.3 Handover between Multicast-supporting cell and Multicast non-supporting cell

During an MBS multicast session, at mobility from an multicast-supporting cell to an non-supporting cell, the target gNB sets up PDU Session Resources mapped to the MBS multicast session. The 5GC infers from the absence of an "MBS-support" indication from gNB in the Path Switch Request message (Xn handover) or Handover Request Acknowledge message (NG handover) that MBS multicast data packets delivery has to be switched to 5GC individual MBS traffic delivery as specified in TS 23.247 [45]. If data forwarding is applied, the source gNB infers from the handover preparation response message that the target gNB does not support MBS and changes the QFI(s) in the forwarded packets to the associated PDU Session QFI(s) if respective mapping information is available. The source gNB may be aware that the target gNB is non-multicast supporting already before Handover Preparation.

For mobility from MBS non-supporting cell to MBS-supporting cell, the existing Xn/NG handover procedures apply. The 5GC infers from the presence of the "MBS-support" indicator from gNB in the Path Switch Request message (Xn handover) or in the Handover Request Acknowledge message (NG handover) that MBS multicast data packets delivery can be switched from 5GC Individual MBS traffic delivery to 5GC Shared MBS traffic delivery. After Xn handover, the SMF triggers switching MBS multicast data packets delivery from 5GC Individual to 5GC Shared MBS traffic delivery by providing MBS Session IDs joined by the UE to the target gNB by means of the PDU Session Resource Modification procedure. For NG handover, the SMF provides the MBS Session IDs joined by the UE to the target gNB by means of NGAP Handover Request. Minimization of data loss and duplication avoidance may be applied by means of identical MBS QFI SNs received over the shared NG-U tunnel against those received over unicast NG-U tunnels or forwarding tunnels.

Mobility from a multicast-supporting cell to a non-supporting cell can be achieved by switching the MRB to a DRB in the source gNB before a handover.

NOTE: A UE may be handed over to a target gNB not supporting MBS without prior reconfiguration from MRB to the DRB in the source gNB. In this case, the AS configuration may not be comprehended by the target gNB causing full configuration.

##### 16.10.5.3.4 MRB reconfiguration

The gNB may use *RRCReconfiguration* message to configure or reconfigure a multicast MRB, e.g., add/release/modify the MRB's RLC entities as described in clause 16.10.3. In order to minimize the data loss due to MRB reconfiguration, gNB may configure UE to send a PDCP status report during reconfiguration for MRB type change.

#### 16.10.5.4 Reception of MBS Multicast data

For multicast service, gNB may deliver multicast MBS data packets using the following methods:

- PTP Transmission: gNB individually delivers separate copies of MBS data packets to each UEs independently, i.e., gNB uses UE-specific PDCCH with CRC scrambled by UE-specific RNTI (e.g., C-RNTI) to schedule UE-specific PDSCH which is scrambled with the same UE-specific RNTI.

- PTM Transmission: gNB delivers a single copy of MBS data packets to a set of UEs, e.g., gNB uses group-common PDCCH with CRC scrambled by group-common RNTI to schedule group-common PDSCH which is scrambled with the same group-common RNTI.

If a UE is configured with both PTM and PTP transmissions, a gNB dynamically decides whether to deliver multicast data by PTM leg and/or PTP leg for a given UE based on the protocol stack defined in clause 16.10.3, based on information such as MBS Session QoS requirements, number of joined UEs, UE individual feedback on reception quality, and other criteria. The same QoS requirements apply regardless of the decision.

and

#### 16.10.6.2 Configuration

MBS broadcast can be received by UEs in RRC\_IDLE, RRC\_INACTIVE and RRC\_CONNECTED state. A UE can receive the MBS configuration for broadcast session (e.g., parameters needed for MTCH reception) via MCCH in RRC\_IDLE, RRC\_INACTIVE and RRC\_CONNECTED state. The parameters needed for the reception of MCCH are provided via System Information.

The following principles govern the MCCH structure:

- MCCH provides the list of all broadcast services with ongoing sessions transmitted on MTCH(s) and the associated information for broadcast session includes MBS session ID, associated G-RNTI scheduling information and information about neighbouring cells providing certain service on MTCH(s). MCCH content is transmitted within periodically occurring time domain windows, referred to as MCCH transmission window defined by MCCH repetition period, MCCH window duration and radio frame/slot offset;

- MCCH uses a modification period and MCCH contents are only allowed to be modified at each modification period boundary; a notification mechanism is used to announce the change of MCCH contents due to broadcast session start, modification or stop and due to neighbouring cell information modification;

NOTE: It is up to UE implementation to use the start and stop times in the USD to determine when to start monitoring the MCCH for the session the UE is interested in.

- When the UE receives an MCCH change notification, it acquires the updated MCCH in the same MCCH modification period where the change notification is sent.

**Question 3**: Any comments on purely editorial changed highlighted yellow above?

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes with comments | 16.10.5.4 Reception of MBS Multicast data For multicast service, gNB may deliver multicast MBS data packets using the following methods:  For this change, it should be “MBS multicast data”. |
| Qualcomm | Non-essential | These are mostly editorial changes. Maybe a beautification CR by spec rapp could do these, but hard to justify a separate MBS-specific CR after almost after a year of release freeze. |
| MediaTek | Yes |  |
| NEC | Yes with comment | BTW, if we use “multicast supporting” instead of “MBS-supporting”, the preposition “an” should also be replaced. |
| Lenovo | No strong view |  |
| Sharp | Yes |  |
| CATT | Yes |  |
| Ericsson | See comments | The corrections for 16.10.5.3.3 were treated in Q2? If so, same view as in Q2.  We agree with the comment from Huawei and NEC. |
| vivo | No | We are fine with those editorial corrections. |
| LGE | Non-essential | Same view as QC. |
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**Summary 3**: TBD.

**Proposal 3**: TBD.

## MBS service continuity

[R2-2304154](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304154.zip) discussed broadcast continuity and receiving broadcast service via unicast.

The paper claims that concerns have been raised that the UE should not use unicast reception in a cell where the session is provided via PTM [2]. And from 38.300 it is not clear if:

* UE requests unicast reception on serving or neighbour cell
* When unicast reception is stopped/released

For mission critical use case the service continuity between MBS broadcast PTM and unicast reception is described in TS 23.289 (Mission Critical serices specification) section 7.3.3.8:

It is also noted in the paper that it is not clear whether there are further requirements defined to report “MBS listening status” (e.g. for MCPTT, video, data). But it is assumed that based on the information in the NCL the UE could send a “bad quality report” even when the quality is still good, which would trigger the application server to configure unicast reception. Furthermore when the UE enters a cell where the service is provided via PTM, then the UE reports good PTM quality which triggers the server to stop/releaser the unicast reception.

It is also highlighted that It is not clear whether “request unicast reception” is the correct terminology to use in 38.300, and whether this can also be used for “request to stop unicast reception”.

Paper comments that MBS broadcast service continuity described in 38.300 section 16.10.6.5.1 covers two use cases:

1. Early request of unicast reception based on NCL info on serving cell
2. Frequency prioritization to start receiving MBS broadcast on another frequency

It is also noted that these two use cases are described in the same paragraph. Furthermore there is a NOTE for use case 2 to clarify that if the UE reselects to a prioritized frequency, but the selected cell on that frequency does not support MBS, then the UE may request unicast reception after cell reselection. But for use case 1 it is described in the procedure text that the UE may request unicast before cell reselection, which may cause confusion:

**Proposal 2**: Describe use case 1 and 2 in separate paragraphs, move the NOTE below the description on frequency prioritization, and add to the NOTE “After inter-frequency cell reselection”

And proposes following TP:

-----------------------------TP STARTS-----------------------------------------------

[xx] 3GPP TS 23.289: "Mission Critical services over 5G System; Stage 2".

Mobility procedures for MBS reception allow the UE to start or continue receiving MBS service(s) when changing cells. The gNB may indicate in the MCCH the list of neighbour cells providing the same MBS broadcast service(s) as provided in the serving cell. This allows the UE, e.g., to request unicast reception of the service before moving to a cell not providing the MBS broadcast service(s) using PTM transmission. The UE requests to stop unicast reception as specified in TS 23.289 section 7.3.3.8 [xx].

To avoid the need to read MBS broadcast related system information and potentially MCCH on neighbour frequencies, the UE is made aware of which frequency is providing which MBS broadcast services via PTM, through User Service Description (USD), as defined in TS 26.346 [46], or the combination of the following:

- USD;

- SIB21, as defined in clause 7.3.1.

In RRC\_IDLE and RRC\_INACTIVE, the UE applies the normal cell reselection rules with the following modifications:

- the UE which is receiving or interested to receive MBS broadcast service(s) via PTM and can only receive these MBS broadcast service(s) via PTM while camping on the frequency providing these MBS broadcast service(s) is allowed to make this frequency highest priority when the conditions described in TS 38.304 [10] are met;

- when the MBS broadcast service(s) which the UE is interested in are no longer available (after the end of the session) or the UE is no longer interested in receiving the service(s), the UE no longer prioritises the frequency providing these MBS broadcast service(s).

NOTE: After inter-frequency cell reselection the UE can request unicast reception of the service after moving to a cell not providing the MBS broadcast service(s) using PTM transmission.

-------------------------TP STOPS-----------------------------------------------

Rapporteur view: Moving and changing note seems to omit handover scenario altogether? Is this the intentional or accidental?. It does not seem correct in this sense. Then it seems TP changes UE behaviour so that it does not allow flexibility for the UE to request unicast before/after reselection based on the scenario. This seems rather major change in the UE behaviour. Regarding reference to 23.289 and requesto to stop unicast reception: In our understanding UE knows the service area via service announcement for 28.289 purposes and there is no relation to Uu MBS NCL.

**Question 4**: Do you think we need to capture mission critical services expliclitly in the stage-2 regarding MBS reception? And if yes, do you agree with TP or do ou have alternative proposal?

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| Answers to Question 1 | | |
| Company | Yes/No | Technical Arguments |
| Ericsson | No, not anymore | **@ rapporteur:** thanks for the comments and questions:  About the NOTE:   * We checked when the NOTE was introduced and this was during:   + [offline-604][MBS-R17] Stage-2 corrections and CR (CMCC). * There was a discussion whether the procedure text should say “*before or after*”. And for obvious reasons “*before*” was kept in the procedure text, and in the NOTE it was clarified that the UE can also request unicast *after* cell change as well (e.g. when the NCL is not present). * In our understanding with SC-PTM and frequency prioritization the UE may end up on a cell not providing the PTM session the UE is interested in. And in such case the UE can request unicast after cell reselection. But this was perhaps not the original intention of the NOTE. * Perhaps it is more clear what the NOTE is trying to say when we add “e.g. when neighbour cell information is not available”?   About stopping unicast reception:   * Agree, that the NCL is not used for stopping. The UE could use the cell/TAI list in USD to request to stop unicast reception. Our SA2 colleague indicated that this is mandatory to be provided, but not sure if this is explicitly captured somewhere? If the UE needs to acquire this via *SIB20*/MCCH there could be some issues and not sure how it works when the PTM is on SCell. * So based on the USD info the UE would sent MII info, configure MBS broadcast in connected mode, and then report “MBS listening”, which triggers the application to stop unicast reception, which then may trigger the UE to be released if nothing else is going.   **Mission critical is not the only use case**, i.e. there can be other use cases, as specified in TS 23.434 for service enabler architecture layer for verticals (SEAL) also uses the listening status report (section 14.3.2.4).  The NW enables/disables unicast reception for the UE based on the reports send by the UE. It is our understanding that the measurement and reporting requirements are specified up to a certain detail. The mission critical reports are not periodic, but they are event driving e.g. when the listening status changes. It also seems that the reporting can be rather simple, e.g. “Listening” and “Not listening” status.  In our understanding 23.289 and 23.434 do not mention that the UE may know in advance based on the NCL info that the listening will become bad. This is just an observation, we are not sure if they should be updated. It seems that some details are left to UE implementation. PS: we wondered if there is a risk that the UE in RRC\_INACTIVE experiences bad quality and would request unicast reception.  **Just for information:** The service continuity solutions discussed for MBMS/SC-PMT Rel-13 LTE can be found in TR [36.890](https://www.3gpp.org/ftp/Specs/archive/36_series/36.890/36890-d00.zip). The neighbour cell list was introduced in LTE when the UE needs to switch from PTM to unicast (section 7.4 in 36.890):  **- Solution 4: Broadcast of neighbouring cell SC-PTM control inf**o  One cell could broadcast the SC-PTM control info of the neighbour cells, so that the service interruption caused by the acquisition of target cell SC-PTM control info after cell reselection or handover could be eliminated.  The text in 38.300 was introduced in [R2-154901](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_91bis/Docs//R2-154901.zip) (endorsed by email discussion [91bis#39]) **15.4 Service Continuity** Mobility procedures for MBMS reception allow the UE to start or continue receiving MBMS service(s) via MBSFN or SC-PTM when changing cell(s). For each MBMS service provided using SC-PTM, E-UTRAN broadcasts the list of neighbour cells providing this MBMS service (FFS whether in SI or SC-MTCH) so that the UE can request unicast reception of the service before changing to a cell not providing the MBMS service using SC-PTM.  We did not find discussion about what “*before changing*” exactly means. The text in 38.300 is very similar, but includes “e.g.”:  Mobility procedures for MBS reception allow the UE to start or continue receiving MBS service(s) when changing cells. The gNB may indicate in the MCCH the list of neighbour cells providing the same MBS broadcast service(s) as provided in the serving cell. This allows the UE, e.g., to request unicast reception of the service before moving to a cell not providing the MBS broadcast service(s) using PTM transmission. To avoid the need to read MBS broadcast related system information and potentially MCCH on neighbour frequencies, the UE is made aware of which frequency is providing which MBS broadcast services via PTM, through User Service Description (USD), as defined in TS 26.346 [46], or the combination of the following:  We are not sure in what other use cases the NCL info is used. |
| Huawei, HiSilicon | No | As this is not AS behaviour, it is not needed in RAN stage 2 CR. |
| MediaTek | No | It seems it’s not needed now |
| NEC | No | Share same view with E// and HW that we are not sure whether Mission critical is the only case and maybe this is not RAN2 scope. |
| Lenovo | No | Not sure it is AS layer’s behaviour. |
| Sharp | No |  |
| CATT | No | On the note change we share the same view with the rapporteur, i.e., the handover scenario is omitted;  On the stop of unicast reception, we share with same view as Huawei, as this is not essential to be captured in RAN stage 2 CR. |
| vivo | No | We don’t need to specify the potential interaction behavior between AS and NAS, considering the Rel-17 spec has been frozen. |
| LGE | No | It seems not essential in RAN2 spec. |
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**Summary 4**: TBD.

**Proposal 4**: TBD.

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**Question 5**: Do you agree with moving the note and changing it? If you have alternative proposal please provice it as well.

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | No | We think the original NOTE is fine as it is not intended to cover only “inter-frequency cell reselection”. |
| Qualcomm | No | Similar view as Huawei |
| MediaTek | No |  |
| NEC | No strong view | The intention is to solve both cases of “the selected cell on prioritized frequency does not support MBS” and “the selected cell of which the NCL is not provided”.  But if we agree this change, maybe “inter-frequency” can be removed. |
| Lenovo | No | Same view with Huawei |
| Sharp | No |  |
| CATT | No | See comment of Q4 |
| Ericsson | Yes, see comment (proponent) | * Our intention was not to exclude a use case (“omit handover scenario”) * We still think that the wording “*before moving to a cell*” leaves room for interpretation, i.e. whether this means before cell reselection or before SIB/MCCH acquisition in the target cell. In other words: does the UE go to connected in the serving or target cell to send the “MBS listening report” to request unicast reception? The solution described in TR [36.890](https://www.3gpp.org/ftp/Specs/archive/36_series/36.890/36890-d00.zip) says that the NCL can be used to avoid interruption cause by MCCH acquisition or handover. This seems to say that UE requests unicast in target cell?:   **- Solution 4: Broadcast of neighbouring cell SC-PTM control inf**o  One cell could broadcast the SC-PTM control info of the neighbour cells, so that the service interruption caused by the acquisition of target cell SC-PTM control info after cell reselection or handover could be eliminated.   * One could and perhaps should interpret “*moving to a cell*” to include both intra-frequency and inter-frequency cell re-selection. From that perspective we could drop “inter-frequency cell reselection”. * It is not that we want to insist on a change, but would it not be better to move the NOTE? As pointed out the NOTE is not specifically for inter-frequency. And the “*before*” and “*after*” is better understood with an example:   Mobility procedures for MBS reception allow the UE to start or continue receiving MBS service(s) when changing cells. The gNB may indicate in the MCCH the list of neighbour cells providing the same MBS broadcast service(s) as provided in the serving cell. This allows the UE, e.g., to request unicast reception of the service before moving to a cell not providing the MBS broadcast service(s) using PTM transmission.  NOTE: UE can request unicast reception of the service after moving to a cell not providing the MBS broadcast service(s) using PTM transmission (e.g. when neighbour cell information is not available)..  To avoid the need to read MBS broadcast related system information and potentially MCCH on neighbour frequencies, the UE is made aware of which frequency is providing which MBS broadcast services via PTM, through User Service Description (USD), as defined in TS 26.346 [46], or the combination of the following:  - USD;  - SIB21, as defined in clause 7.3.1. |
| vivo | No | The existing NOTE gives an example of UE implementation to utilize the NCL. Nothing is wrong. |
| LGE | No | The current NOTE just mentions one possible UE behaviour, it doesn’t exclude other UE behaviours. |
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**Summary 5**: TBD.

**Proposal 5**: TBD.

# U-plane

## MBS Rel. 17 UP issue (6.2.3)

In this section, three papers which are submitted to RAN2 in 6.2.3, and proposal 6 of the paper ([R2-2303967](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303967.zip)) which is submitted to RAN2 6.2.2 are considered.

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| [R2-2302767](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302767.zip) | Corrections on cfr-ConfigMulticast and Multicast DRX | NEC Corporation, LG Electronics Inc, Nokia, Nokia Shanghai Bell, Samsung | [**38.321**](https://www.3gpp.org/ftp/Specs/archive/38_series/38.321/38321-h40.zip) | 17.4.0 |
| [R2-2302768](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302768.zip) | Discussion on the correction for cfr-ConfigMulticast and Multicast DRX | NEC Corporation, LG Electronics Inc, Nokia, Nokia Shanghai Bell, Samsung |  |  |
| [R2-2303067](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303067.zip) | UP Corrections for MBS | Samsung R&D Institute India | [**38.321**](https://www.3gpp.org/ftp/Specs/archive/38_series/38.321/38321-h40.zip) | 17.4.0 |
| [R2-2303967](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303967.zip) | Discussion on the remainning MBS issues | Huawei, HiSilicon |  |  |

### cfr-ConfigMulticast and Multicast DRX

In RAN#121, it is agreed that that ‘**UE doesn’t need to report CSI if cfr-ConfigMulticast is not included in the current active BWP, even if the allowCSI-SRS-Tx-MulticastDRX-Active-r17 is configured’.**

In R2- 2302767, the change is claiming reason that if the UE's current active BWP does not fully incorporate CFR, then both CSI reporting and multicast DRX should not be initiated as mentioned below:

* “Besides allowCSI*-SRS-Tx-MulticastDRX-Active*, *drx-ConfigPTM* is also configured in MAC configuration which is common for all configured BWP(s). UE can still run multicast DRX even though there is no CFR configured in the current active BWP. Note that based on RAN1 spec, although UE is not expected to monitor PDCCH or PDSCH for multicast outside of CFR, starting multicast DRX in this case is not a correct UE behavior which breaks the DRX principal. Therefore, if the current active BWP of UE does not fully include CFR (i.e., UE is not receiving multicast service), not only CSI reporting is not needed, but also **multicast DRX should not be started”**

And the corresponding changes are mentioned as

* In section 5.7, remove that “or if cfr-ConfigMulticast is not configured for any of the active BWP(s) of the Serving Cell(s)
* In section 5.7b, add a condition that UE considers running multicast DRX Active Time only when cfr-ConfigMulticast is configured for any of the active BWP(s) of the Serving Cell(s).

The discussion on the above change is presented in [R2-2302768](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302768.zip).

Rapporteur view: The changes are valid, and it is the correct behavior. We agree with the changes mentioned.

**Question 1**: Do you think it is beneficial to have above change? And please provide any arguments one way or other.

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| Answers to Question 1 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | See comments | We understand the intention is to specify that if there is no CFR configured in active BWPs, multicast DRX active timers shouldn’t be running. On this aspect we agree.  But this doesn’t solve the unnecessary CSI reporting issue:   1. Consider the case where multicast DRX is not configured, according to this CR, the UE will still report CSI for multicast even if no CFR is configured in active BWPs. 2. If in BWP1 (with CFR), the UE starts the active DRX timers and then the UE is switched to BWP2 (without CFR), due to timer running, the UE will still report CSI for multicast even if no CFR is configured.   Some may argue the timer can be stopped, But in this case, when the UE is switched backed BWP1, what is the UE behaviour: start the timer again?  So the changes RAN2 agreed in the last meeting is necessary. And for the unnecessary multicast DRX active timers running issue, we can discuss separately. |
| Qualcomm | See comments | Intent seems correct.  Regarding the wording, for the opposite of "…is not configured for any..", it is better to use "… is configured for at least one .." (instead of simply saying "… is configured for any…")  … and the *cfr-ConfigMulticast* is configured for at least one ~~any~~ of the active BWP(s) of the Serving Cell(s),.. |
| MediaTek | Yes with comment | The intention is correct, but the delete of “or if cfr-ConfigMulticast is not configured for any of the active BWP(s) of the Serving Cell(s),” in section 5.7 may not needed. We only need to add the configuration in 5.7b |
| NEC | Yes | First, the principal of this CR is that “if the current active BWP of UE does not fully include CFR (i.e., UE is not receiving multicast service), not only CSI reporting is not needed, but also multicast DRX should not be started”. Therefore, some specification to correct DRX behaviour is needed.  Second, for unnecessary CSI reporting issue raised by HW:  The case of “where multicast DRX is not configured”, there is nothing related to allowCSI-SRS-Tx-MulticastDRX-Active (i.e., the initial issue is raised due to this IE) as this IE is used when the MAC entity is configured with a DRX functionality. To be honest, this is another issue which is not specified in DRX Spec (i.e., the behaviour of restricting CSI reporting is only specified when DRX is configured at least from MAC point of view).  For this part, the CR does not intend to resolve the issue (1) as raised by HW and if there is an interest for some companies to resolve the issue, a new CR should be provided. In addition, it should be highlighted that the issue as indicated by HW is not an outcome of the potential implementation of the CR in the spec.  For the case of “BWP switching from with CFR to without CFR”, UE will eventually run out of the so called “last one” DRX Active Time, there is no big issue here. Furthermore if UE back to BWP with CFR again, UE just run DRX pattern (e.g., onD Timer) based on formula of DRX cycle as this is normal case.  But it is noted that the intention is to correct DRX behaviour and we think this CR can make it.  BTW, we are also fine with QC’s modification suggestion. |
| Lenovo | See comments | We tend to agree that ‘If the cfr-ConfigurMulitcast is not configured for any of the active BWPs, the multicast DRX shouldn’t not be running’. But as Huawei pointed it out, it is not clear how to handle the running DRX timers when BWP switches. |
| CATT | Need clarify | We understand that the mentioned case is that the cfr-ConfigMulticast is not configured for any of the active BWP(s) of any Serving Cell(s), but multicast DRX is configured?  If it is the case,We think it is not a valid configuration, it is not reasonable to configure multicast DRX but the cfr-ConfigMulticast is not configured for any of the active BWP(s) of any Serving Cell(s). |
| Ericsson | Comment. | Needs more discussion. The deletion is not necessary as many other companies points out. For a future change, a change acc. to what QC suggests is better. |
| vivo | Comments | Firstly, the change to 5.7 is not needed as the current spec is okay. Nothing is wrong.  Secondly, for 5.7a, the CR only considers the case whether the DRX timer should be started or not when CFR is not configured. We are wondering whether we needs to consider the the stopping timer (if running) case, i.e.  **if cfr-ConfigMulticast is not configured for any of the active BWP(s) of the Serving Cell(s), whether the multicast DRX timer(s) if running should be stopped?** |
| LGE | Yes | We support that multicast DRX is not be in Active Time when no CFR is configured by the change, and we think that CSI is not reported for multicast DRX if multicast DRX is not in Active Time.  Regarding the case where multicast DRX is not configured (case 1 in Huawei’s comment), we think that CSI is not reported for multicast DRX because of the condition that all multicast DRXes would not be in Active Time. Besides, we think that unnecessary CSI reporting issue for the case where DRX is not configured is not considered in the condition for CSI reporting control. Previously, *allowCSI-SRS-Tx-MulticastDRX-Active* and Active Time of multicast DRXes are checked for determining whether to report CSI for multicast DRX or not. It is also noted that *allowCSI-SRS-Tx-MulticastDRX-Active* is used to control CSI reporting during MBS multicast DRX Active Time.  Regarding the case that BWP is switched to another BWP without CFR, CSI may be reported unnecessarily for one DRX cycle. But, this can be avoided, for example, by the following change (the third change in R2-2302767).  When multicast DRX is configured for a G-RNTI or G-CS-RNTI, and the *cfr-ConfigMulticast* is configured for any of the active BWP(s) of the Serving Cell(s), the Active Time includes the time while:  - *drx-onDurationTimerPTM* or *drx-InactivityTimerPTM* or *drx-RetransmissionTimerDL-PTM* for this G-RNTI or G-CS-RNTI is running. |
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**Summary 1**: TBD.

**Proposal 1**: TBD.

Proposal 6 of R2-2303967 proposes “**RAN2 to delete the unnecessary start condition of *drx-HARQ-RTT-TimerDL* (i.e., if the first HARQ-ACK reporting mode (i.e. ack-nack) is configured)”** as according to the discussion in RAN1, for NACK-only, PTP retransmission can be also supported when NACK-only is converted into ACK/NACK.

Rapporteur view: Its not okay to have PTP retranmissions also upon NACK-only, which does not make sense.

**Question 2**:: Do you agree with the proposal? And please provide any arguments one way or other.

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes | Proponent.  According to RAN1’s agreements and also RAN1 discussion in the last meeting, when NACK-only feedback is multiplexed with other PUCCH/PUSCH transmission, it will be transformed into ACK/NACK feedback. In this case, the NW is able to identify which UE didn’t receive the data and schedule retransmission via C-RNTI even when NACK-only is configured. In other words, the UE may miss the scheduling according to current spec. The simple way is to delete the condition.  Some RAN1 agreements for reference:  *When UE is configured with unicast SPS and multicast SPS with NACK-only based feedback for multiplexing on the same PUCCH for the same priority case, NACK only based HARQ-ACK is transformed to ACK/NACK based HARQ-ACK.*   * *For NACK only based HARQ-ACK transformed to ACK/NACK based HARQ-ACK, the HARQ-ACK codebook is constructed as for multiple SPS PDSCHs regardless of unicast SPS PDSCH or multicast SPS PDSCH and the PUCCH carrying the multiplexed HARQ-ACK is determined from the SPS-PUCCH-AN-List configured for unicast, as agreed for ACK/NACK based feedback.*   *When the nominal NACK-only PUCCH overlaps with other PUCCH/PUSCH transmission, NACK-only is transformed into ACK/NACK and multiplexed with other PUCCH/PUSCH transmission.* |
| Qualcomm | Intent seems ok | As explained by Huawei above. |
| MediaTek | Yes |  |
| Lenovo | Seems OK | It seems fine if we follow RAN1’s agreements mentioned by Huawei above. |
| CATT | Yes |  |
| Ericsson | ok |  |
| vivo | Maybe No | However, as per the RAN1 spec, the mentioned case seems not valid.  **A PDSCH reception providing an initial transmission of a transport block is scheduled only by a multicast DCI format. For the first HARQ-ACK reporting mode, a PDSCH reception providing a retransmission of the transport block can be scheduled either by a multicast DCI format using a same G-RNTI for multicast as the G-RNTI for multicast of the initial transmission of the transport block, or by a unicast DCI format using a C-RNTI [6, TS 38.214].** |
| LGE | No | As explained by Huawei, NACK only HARQ feedback can be converted to HARQ/ACK feedback. However, it seems to be decided when HARQ feedbacks are multiplexed at PHY. MAC needs to receive indications for the conversions for precise DRX control. Also, it’s not clear how often the opportunity happens.  Currently, gNB and UE knows availability of PTP retransmission based on RRC configuration about HARQ feedback mode for MBS multicast (*harq-FeedbackOptionMulticast*).  We think it is sufficient to perform PTP retransmission based on the RRC configuration. If gNB want PTP retransmission, it can configure HARQ feedback mode to ‘ack-nack’. |
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**Summary 2**: TBD.

**Proposal 2**: TBD.

### HARQ feedback

The second change in R2-2303067 states that when disabling the HARQ feedback, it is necessary to take into account both situations: when it is not configured in accordance with 38.331, and when it is disabled for the G-RNTI or G-CS-RNTI as specified in 38.213 as mentioned below:

* HARQ feedback is not provided when it is disabled for this G-RNTI or G-CS-RNTI as per TS 38.213. However, it also needs to consider the case when HARQ feedback (i.e. *harq-FeedbackEnablerMulticast-r17*) is not configured as per TS 38.331. This needs to be captured.

The corresponding changes are mentioned as:

“In sec 5.3.2.2, specify as below, for a condition of not instructing the physical layer to generate acknowledgement(s) of the data in this TB.

1. if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and HARQ feedback is either not configured for this G-RNTI or G-CS-RNTI, as specified in TS 38.331 or disabled for this G-RNTI or G-CS-RNTI, as specified in clause 18 of TS 38.213 [6]; or “

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| 1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and HARQ feedback is either not configured for this G-RNTI or G-CS-RNTI, as specified in TS 38.331 or disabled for this G-RNTI or G-CS-RNTI, as specified in clause 18 of TS 38.213 [6]; or |

Rapporteur view: Everything regarding enabling/disabling of HARQ and when the UE does not provide feedback is covered by 38.213. Even 38.331 is refering to 38.213. So we would keep "not configured" but we do not keep "38.331 reference"

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| 1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and HARQ feedback is either not configured or is disabled for this G-RNTI or G-CS-RNTI, as specified in clause 18 of TS 38.213 [6]; or |

**Question 3**: Do you think it is beneficial to have above change? And please provide any arguments one way or other.

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | No | We think “not configured” can be covered by “disabled”. There are two ways of disabling: one is by RRC and the other is by DCI. |
| Qualcomm | No | Similar view as Huawei. In additional, the RRC spec/parameter already explains that absent means 'not used'/disabled and refers to RAN1 spec. |
| MediaTek | No |  |
| NEC | Comment | Same view with rapporteur if we want to specify this. |
| Lenovo | No | Similar view with Huawei. |
| Sharp | No |  |
| CATT | No | As mentioned by the Rapporteur, everything regarding enabling/disabling of HARQ has been reflected by RAN1 spec 38.213, so no need to do any further clarification. |
| Ericsson | No | Agree with others |
| vivo | No | The reference to PHY spec has covered all the cases. No change is needed for RAN2 spec. |
| LGE | No | Similar view as Huawei. |
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**Summary 3**: TBD.

**Proposal 3**: TBD.

The reason for the first change in R2-2303067 is that the correct reference for clause 5.8.1a was missed in section 5.3.1 regarding the handling of configured DL assignment for MBS multicast as mentioned below:

“In sec 5.3.1, for handling of configured DL assignment for MBS multicast, clause 5.8.1a should be referred. Correct clause reference is missed.”

The corresponding changes are mentioned as:

“In sec 5.3.1, add a reference to clause 5.8.1a for handling of configured DL assignment for MBS mutlicast”

Rapporteur view: Agree with the change

**Question 4**: Do you think it is beneficial to have above change? And please provide any arguments one way or other.

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes |  |
| Qualcomm | Yes |  |
| MediaTek | Yes |  |
| NEC | Yes |  |
| Lenovo | Yes |  |
| Sharp | Yes |  |
| CATT | Yes |  |
| Ericsson | Yes |  |
| vivo | Yes |  |
| LGE | Yes |  |
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**Summary 4**: TBD.

**Proposal 4**: TBD.

The reason for the third change in R2-2303067 is that, for MBS, receiving a MAC PDU containing a reserved or unsupported LCID or eLCID is an errorneous case and it’s handling is missed in sec 5.13 as mentioned below:

“For MBS, receiving a MAC PDU containing an LCID or eLCID which is not configured is not an errorneous (can happen due to multiplexing) and is handled in sec 5.3.3 Diassembly and demultiplexing. However, for MBS, receiving a MAC PDU containing a reserved or unsupported LCID or eLCID is an errorneous case and it’s handling is missed in sec 5.13”

The corresponding change is mentioned as:

“In sec 5.13, specify a new erroneous case handling for MBS as below

When a MAC entity receives a MAC PDU for the MAC entity's G-RNTI or G-CS-RNTI, or by the configured downlink assignment for MBS multicast, containing a Reserved LCID or eLCID value, or an LCID or eLCID value the MAC Entity does not support, the MAC entity shall at least:

1> discard the received subPDU and any remaining subPDUs in the MAC PDU”

Rapporteur view: Agree with the change

**Question**  5: Do you think it is beneficial to have above change? And please provide any arguments one way or other.

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| Answers to Question 2 | | |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes |  |
| Qualcomm | Intent ok, see comments | We had notified of this potential oversight to the spec rapporteur before, but at that time the thinking was no change was needed. We are glad to see the changes in this area and are ok with the intention, but have two questions:  1. wondering if the new text can be directly included in the first bullet. E.g. like  When a MAC entity receives a MAC PDU for the MAC entity's C-RNTI, CS-RNTI, G-RNTI, G-CS-RNTI or by the configured downlink assignment, containing a Reserved LCID or eLCID value, or an LCID or eLCID value the MAC Entity does not support, the MAC entity shall at least:  1> discard the received subPDU and any remaining subPDUs in the MAC PDU.  2. wondering is there any impact of such 'discarding' of some packets on MTCH to the Data inactivity monitoring in 5.19? As such, are subsequently discarded packets counted as 'received' packets in 5.19? (Note that in LTE, the MTCH data didn’t impact inactivity monitoring, but in NR it does)  **LTE:**  When *DataInactivityTimer*is configured, the MAC entity shall:  -     if the MAC entity receives the MAC SDU for DTCH logical channel , DCCH logical channel, or CCCH logical channel; or  -     if the MAC entity transmits the MAC SDU for DTCH logical channel, DCCH logical channel;  -     start or restart *DataInactivityTimer*.  -     if *DataInactivityTimer* expires, indicate the expiry of *DataInactivityTimer* to upper layers.  **NR:**  When *dataInactivityTimer* is configured, the UE shall:  1>  if any MAC entity receives a MAC SDU for DTCH logical channel, DCCH logical channel, or CCCH logical channel, or multicast MTCH logical channel; or  1>  if any MAC entity transmits a MAC SDU for DTCH logical channel, or DCCH logical channel:  2>  start or restart *dataInactivityTimer*. |
| MediaTek | Yes | Ok with the change |
| NEC | Yes | Since this is not covered by clause 5.3.3 |
| Lenovo | Yes | QC’s comments on DataInactivityTimer: it seems not a multicast specific issue. It may also impact DCCH/DTCH/CCCH when UE discard a MAC PDU including unicast data. Not sure we need to discuss and solve this issue. Perhaps, it can let to UE implementation. |
| Sharp | Yes |  |
| CATT | Yes | OK to clarify |
| Ericsson | Yes | Could be added to existing text. |
| vivo | Yes |  |
| LGE | Yes, but | We agree to the intent. But, as mentioned by Qualcomm, the change can be merged into the first paragraph of the section. |
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**Summary 5**: TBD.

**Proposal 5**: TBD.

# Conclusion

TBD.