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 |
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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 |
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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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**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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**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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**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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**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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**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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**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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**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 |
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**Summary 5**: TBD.

**Proposal 5**: TBD.

# Conclusion

TBD.