**3GPP TSG RAN meeting #93e RP-21xxxx**

**Electronic Meeting, September 13 - 17, 2021**

## Status Report to TSG

**Agenda item:** 9.7.2.4

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **WI / SI Name** |  | | | | |
| included in this status report | Study Item:  No | Core part:  Yes | Performance part:  No | | Testing part:  No |
| **Acronym** | NR\_MBS | | | | |
| **Unique ID** | 860048 | | | | |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-201038 | | | | |
| **Target Completion Date**  **(indicate if changed)** | Study Item:  N/A | Core part: 03/2022 | Performance part:  N/A | Testing part: N/A | |
| **Overall Completion level** | Study Item:  N/A | Core part:  60% | Performance Part:  N/A | Testing part: N/A | |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |  |
| --- | --- | --- |
| **Leading WG** | | TSG RAN WG2 |
| **Rapporteur** | **Name** | Zhenzhen CAO |
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## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.  
 One time unit (TU) corresponds to ~ 2 hours in the meeting.  
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.  
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

RAN1#106-e agreements

*Mechanisms to support group scheduling for RRC\_CONNECTED UEs*

Agreement:

Confirm the working assumption with the following update:

Option 2B for CFR associated with UE active BWP other than initial DL BWP is supported at least for multicast of RRC-CONNECTED UEs.

* ~~FFS: CFR associated with initial BWP~~
* ~~FFS: CFR larger than initial BWP~~

Note: The deleted FFSs can be discussed in another AI.

Agreement:

For multicast of RRC-CONNECTED UEs, align the size of the first DCI format for GC-PDCCH with DCI format 1\_0 with CRC scrambled by C-RNTI monitored in CSS.

Agreement:

Confirm the following working assumption:

The maximum number of CORESETs per BWP is not increased for support of MBS, and the number of CORESETs configured within the CFR is left to gNB implementation.

Agreement:

For indication of the starting PRB and the length of PRBs of CFR for multicast of RRC-CONNECTED UEs,

* the starting PRB is referenced to Point A, i.e., the starting PRB is a PRB determined by *subcarrierSpacing* of the associated BWP and *offsetToCarrier* corresponding to this subcarrier spacing, similar as how *locationAndBandwidth* of a BWPis indicated as described in TS 38.331.
* FFS: Indication mechanism.

Agreement:

For LBRM and TBS determination for GC-PDSCH:

* The maximum number of layers can be provided by *maxMIMO-Layers* in *PDSCH-Config* for MBS in CFR; if not provided, a default value is defined.
  + FFS the default value.
* The maximum modulation order can be determined from mcs-Table in PDSCH-Config for MBS in CFR;
  + FFS: if *mcs-Table* in *PDSCH-Config* for MBS is not configured in CFR, a value determined from *mcs-Table* in *PDSCH-Config* for unicast in the active DL BWP is used; if the *mcs-Table* in *PDSCH-Config* for unicast is not configured, Table 5.1.3.1-1 in TS38.214 is used (similar as the default value in R16).
* xOverhead can be provided in PDSCH-Config for MBS in CFR; if not provided, a default value of zero is used.
* The number of PRBs is determined based on the size of CFR.

Agreement:

The first DCI format for GC-PDCCH uses the same fields as DCI format 1\_0 with CRC scrambled by C-RNTI with the following modifications:

* At least ‘Identifier for DCI formats’ is not needed.
  + FFS: Whether the field should be ignored and reserved, or should be removed.
* For FDRA determination, down-select from following options:
  + Option 1:
    -  is given by
      * the size of CORESET 0 if CORESET 0 is configured for the cell; and
      * the size of initial DL bandwidth part if CORESET 0 is not configured for the cell.
    - For resource indication value (*RIV*) of downlink resource allocation type 1, the resource blocks that can be indicated are
      * the resource blocks in the CORESET 0 if CORESET 0 is configured for the cell; and
      * the resource blocks in the initial DL bandwidth part if CORESET 0 is not configured for the cell.
  + Option 2:
    -  is given by
      * the size of CORESET 0 if CORESET 0 is configured for the cell; and
      * the size of initial DL bandwidth part if CORESET 0 is not configured for the cell.
    - For resource indication value (*RIV*) of downlink resource allocation type 1, the similar scheme as for the case that the DCI size for DCI format 1\_0 in USS is derived from the size of DCI format 1\_0 in CSS but applied to an active BWP is used.
      * FFS details, e.g., if the size of CFR (i.e. ) is larger than the size of CORESET0/initial DL bandwidth part, the resource indication value (*RIV*) is defined as in section 5.1.2.2.2 in TS38.214, where K is the maximum value from set {1, 2, 4, 8} which satisfies ;otherwise,
  + Option 3:  is given by the size of CFR in the active DL BWP

Agreement:

The second DCI format for GC-PDCCH uses the same fields as DCI format 1\_1 with the following modifications:

* At least ‘Identifier for DCI formats’ and ‘SRS request’ are not needed.
  + FFS whether the fields should be ignored and reserved, or should be removed.
* Note: At least the configurable fields in DCI format 1\_1 remain configurable for the second DCI format

Agreement:

For initializing scrambling sequence generator for GC-PDCCH with the second DCI format,

* equals the higher layer parameter *pdcch-DMRS-ScramblingID* if it is configured in the CORESET in a CFR used for the GC-PDCCH; otherwise.
* FFS: Values for . Choices include one or more of the following:
  + Alt1: G-RNTI used for the GC-PDCCH.
  + Alt2: 0
  + Alt3: Other fixed values

Agreement:

If a SPS-config for MBS is configured in CFR, one G-CS-RNTI is associated with the SPS-config.

* FFS: Multiple G-CS-RNTIs associated with one SPS-config

Agreement:

For FDRA determination of the first DCI format for GC-PDCCH, down-select from Option 2 and updated Option 3.

* + Option 2:
    -  is given by
      * the size of CORESET 0 if CORESET 0 is configured for the cell; and
      * the size of initial DL bandwidth part if CORESET 0 is not configured for the cell.
    - For resource indication value (*RIV*) of downlink resource allocation type 1, the similar scheme as for the case that the DCI size for DCI format 1\_0 in USS is derived from the size of DCI format 1\_0 in CSS but applied to an active BWP is used.
      * FFS details, e.g., if the size of CFR (i.e. ) is larger than the size of CORESET0/initial DL bandwidth part, the resource indication value (*RIV*) is defined as in section 5.1.2.2.2 in TS38.214, where K is the maximum value from set {1, 2, 4, 8} which satisfies ;otherwise,
  + Option 3:  is given by the size of CFR in the active DL BWP
    - If the size of the first DCI format for GC-PDCCH prior to truncation is larger than the size of DCI format 1\_0 monitored in CSS, the bit width of the FDRA field in the first DCI format for GC-PDCCH is reduced by truncating the first few most significant bits such that the size of the first DCI format for GC-PDCCH equals the size of DCI format 1\_0 monitored in CSS.
    - FFS: Whether the removed/reserved fields can be repurposed for FDRA
    - FFS: Solution for the case where the size of the first DCI format for GC-PDCCH prior to padding is smaller than the size of DCI format 1\_0 monitored in CSS.

Conclusion:

The specification impact of having a new Type-x CSS for GC-PDCCH in RRC\_CONNECTED state can be studied and discussed further.

Agreement:

For initializing scrambling sequence generator for GC-PDSCH scheduled by the second DCI format for multicast received in Type-x CSS,

* equals the higher layer parameter *dataScramblingIdentityPDSCH* if it is configured in *PDSCH-Config* in a CFR used for GC-PDSCH and the RNTI equals the G-RNTI or G-CS-RNTI; otherwise.
* corresponds to the RNTI associated with the GC-PDSCH transmission (i.e., the G-RNTI used by the scheduling GC-PDCCH, or the G-CS-RNTI used by the SPS GC-PDSCH activation PDCCH)

Agreement:

For initializing sequence generator for DMRS of GC-PDCCH with the second DCI format received in Type-x CSS,

* equals the higher layer parameter *pdcch-DMRS-ScramblingID* if it is configured in the CORESET in a CFR used for the GC-PDCCH; otherwise.

*Mechanisms to improve reliability for RRC\_CONNECTED UEs*

Agreement:

For UE supporting both unicast and multicast, the *pdsch-HARQ-ACK-Codebook/pdsch-HARQ-ACK-CodebookList* can be separately configured for multicast from that for unicast.

Agreement:

When UE is configured Type-1 codebooks for unicast and multicast with different priorities, respectively, the UE separately generates each of the Type-1 codebooks.

* FFS: How UE is configured one codebook for unicast and one codebook for multicast and the two codebooks are of different priorities.

Agreement:

For a UE configured with Type-1 HARQ-ACK codebook,

* If UE is not configured to receive FDM-ed unicast and multicast, Type-1 HARQ codebook is generated as the agreement for TDM-ed unicast and multicast.
* If UE is configured to receive FDM-ed unicast and multicast, Type-1 HARQ codebook is generated as the agreement for FDM-ed unicast and multicast.

Agreement:

For UEs supporting ACK/NACK-based HARQ-ACK feedback for multicast and unicast, the following values are unchanged compared to unicast in Rel-16:

* + The maximum number of PUCCH resources sets in each *PUCCH-Config*,
  + The maximum number of PUCCH resources in a PUCCH resource set in each *PUCCH-Config*,
  + The maximum number of UCI information bits for the first PUCCH resource set.
  + The total number of PUCCH resources from all *PUCCH-Config/PUCCH-ConfigurationList*.
  + Note:
    - This applies to both cases of whether or not UE is configured optionally with a separate *PUCCH-Config or PUCCH-ConfigurationList* for multicast.
    - The case of NACK-only based is discussed separately.

Agreement:

When UE is configured with the *pdsch-HARQ-ACK-Codebook/pdsch-HARQ-ACK-CodebookList* for ACK/NACK based feedback for multicast, it is applied to all G-RNTIs configured to UE.

Agreement:

For the separate *PUCCH-ConfigurationList* that is optionally configured to UE for NACK-only based HARQ-ACK feedback for multicast,

* + The separate *PUCCH-ConfigurationList* for multicast configuration can be a list which includes up to 2 *PUCCH-Config* configurations corresponding low priority feedback and high priority feedback, respectively.
  + FFS: how to handle the case when separate *PUCCH-ConfigurationList* is not configured to UE for NACK-only based HARQ-ACK feedback for multicast.

Agreement:

The priority index is,

* for the second DCI format for GC-PDCCH, optionally configured to be included in the DCI format. If not configured, the priority index is not included in the DCI format and is low priory by default.
* for the first DCI format for GC-PDCCH, down-select from:
  + - Alt1: Optionally configured to be included in the DCI format. If not configured, the priority index is not included in the DCI format and is low priory by default.
    - Alt2: Always low priority, i.e., the priority index is not included in the DCI format.

Agreement:

The priority of multicast for NACK-only based feedback is the same as the priority of unicast for the same priority index of HARQ-ACK.

Agreement:

When more than one NACK-only based feedback are available for transmission in the same PUCCH slot, down-select from the following alternatives:

* + Alt1: Support UE multiplexing the HARQ-ACK bits by transforming NACK-only into ACK/NACK HARQ bits.
  + Alt2: Support sub-slot based PUCCH for this case.
  + Alt3: Support UE transmitting more than one slot-based PUCCHs in the same PUCCH slot.
  + Alt4: Define combination of NACK-only which corresponds to a specific sequence or a PUCCH transmission.
  + Alt5: NACK-only bundling

Agreement:

When UE supports and is configured with more than one G-RNTI,

* + for Type-2 codebook construction, DAI is separately counted per G-RNTI.
  + Type-2 codebook is constructed by concatenating Type-2 sub-codebook of each RNTI following the ascending order of the G-RNTI value.

Agreement:

Update the WA made in RAN1#105-e meeting regarding enabling/disabling HARQ-ACK feedback as follows:

Working assumption:

For enabling/disabling ACK/NACK-based HARQ-ACK feedback for RRC\_CONNECTED UE receiving multicast via dynamic group-common PDSCH:

* RRC signaling configures the enabling/ disabling function of group-common DCI indicating the enabling /disabling ACK/NACK based HARQ-ACK feedback.
  + If RRC signaling configures the function of group-common DCI based indication, group-common DCI indicates (explicitly or implicitly) whether ACK/NACK based HARQ-ACK feedback is enabled/disabled
  + Otherwise, enabling/disabling ACK/NACK based HARQ-ACK feedback is configured by RRC signaling.
  + FFS details on RRC signaling and group-common DCI indicating.
* FFS whether/how this option is extended to apply to NACK-only based feedback and multiple G-RNTI cases.
* FFS the relation to the HARQ-ACK codebook types and HARQ-ACK codebook construction.
* FFS the relation to the enabling/disabling ACK/NACK based HARQ-ACK feedback for retransmission.
* FFS whether/how to allow UE not to react to the DCI signaling, but instead follow UE-specific RRC configuration for HARQ feedback.
* FFS whether/how to apply it to SPS group-common PDSCH.
* UE capability for enabling/ disabling function of group-common DCI indicating the enabling /disabling ACK/NACK based HARQ-ACK feedback is introduced and FFS details.
* Note: It is up to network implementation to avoid any potential HARQ ACK mismatch between different UEs in the same multicast group

Agreement

For UE supports both ACK/NACK-based and NACK-only based HARQ-ACK feedback for multicast SPS PDSCH without PDCCH scheduling, select one or more of the following alternatives:

* + Alt1: HARQ-ACK feedback option is configured per SPS configuration index.
  + Alt2: HARQ-ACK feedback option is indicated in the SPS activation DCI.
  + Note: enabling/disabling HARQ-ACK feedback for multicast SPS can be discussed separately.

*Basic functions for broadcast/multicast for RRC\_IDLE/RRC\_INACTIVE UEs*

Agreement:

From RAN1 perspective, the CFR for broadcast reception of RRC\_IDLE/INACTIVE UEs, includes at least the following configurations:

* One set of parameters configured for PDSCH for broadcast reception with GC-PDSCH
* One set of parameters configured for PDCCH for broadcast reception with GC-PDCCH
* FFS: whether some parameters configured for PDSCH/PDCCH are optional/needed for the supported cases of CFR.
* FFS: If necessary, depending on the cases supported, starting PRB and the number of PRBs
  + The reference for starting PRB is Point A. (Following the same approach to determine reference for starting PRB as that defined in AI8.12.1.)

Conclusion:

There is no specification support in Rel-17 for broadcast reception with RRC\_IDLE/RRC\_INACTIVE UEs with configured/defined CFRs for group-common PDCCH/PDSCH with smaller size than the initial BWP, where the initial BWP has the same frequency resources as CORESET0 (i.e., Case B).

Agreement:

For RRC\_IDLE/RRC\_INACTIVE UEs, for broadcast reception, if searchSpace#0 is configured for MTCH, the mapping between PDCCH occasions and SSBs is the same as for SIB1.

Agreement:

Study and reach an agreement by RAN1#106b-e on whether Alt1 and Alt2 for MCCH change notification indication can accommodate at least 2 bits for the notification of MCCH configuration changes due to a session start and the notification of MCCH configuration changes of an ongoing session (including session stop).

Agreement:

The DCI format for GC-PDCCH scheduling a GC-PDSCH carrying MCCH/MTCH at least includes the following fields for broadcast reception with UEs in RRC\_IDLE/INACTIVE state:

* FDRA field
* TDRA field
* Modulation and coding scheme
* Redundancy version
* FFS:
  + MCCH change notification (if supported and only for MCCH),
  + RB numbering starts from the lowest RB of the CFR and support of resource allocation with granularity of single or multiple RBs.
  + HARQ process number and New data indicator
  + VRB-to-PRB mapping
  + other fields if needed.

Agreement

Only one CFR can be configured for group-common PDCCH/PDSCH carrying MCCH for broadcast reception with UEs in RRC\_IDLE/INACTIVE state.

Agreement

For broadcast reception with UEs in RRC\_IDLE/INACTIVE state, the DCI size of GC-PDCCH scheduling a GC-PDSCH carrying MCCH/MTCH is aligned with DCI format 1\_0 with CRC scrambled by C-RNTI in the CSS.

Agreement:

For broadcast reception, RRC\_IDLE/RRC\_INACTIVE UEs can use the same bandwidth configurations for the CFR of GC-PDCCH/PDSCH carrying MCCH and the CFR of GC-PDCCH/PDSCH carrying MTCH.

* FFS: use of different bandwidth configurations for the CFR of GC-PDCCH/PDSCH carrying MCCH and the CFR of GC-PDCCH/PDSCH carrying MTCH

Conclusion:

For broadcast reception with RRC\_IDLE/RRC\_INACTIVE UEs, there is no specification support in Rel-17 of different CSS types for GC-PDCCH scheduling MCCH and MTCH.

Agreement:

Study whether the Type-x CSS supported for multicast in RRC\_CONNECTED can be reused as baseline for broadcast in RRC\_IDLE/RRC\_INACTIVE for GC-PDCCH scheduling MCCH and MTCH.

Agreement:

For RRC\_IDLE/RRC\_INACTIVE UEs with broadcast reception, if common search space other than searchSpace#0 is configured for MTCH, the mapping of PDCCH monitoring occasions to SSBs can be configured with a rule.

* The existing rule defined for OSI in TS 38.331 is used as starting point to define the above rule.

#### 2.1.2 Remaining Open issues

* Group scheduling mechanism for MBS in RRC\_CONNECTED state, including enhancements to enable simultaneous operation with unicast reception
* Reliability improvement mechanisms for MBS in RRC\_CONNECTED state
* Required changes for MBS in RRC\_IDLE/ RRC\_INACTIVE states

## 2.2 RAN2

#### 2.2.1 Agreements

RAN2#115-e agreements

***L2 related:***

* MRB configuration and procedures in RRC are separated from DRB configuration and procedures (as in current CR).
* MRB is defined as MBS Radio Bearer, which denotes radio bearers carrying both multicast and broadcast sessions.
* In RRC signalling, one MRB can be configured with PTM only or PTP only or both PTM and PTP. Whether PTM, PTM+PTP or PTP-only can be changed from one to other via RRC signaling.
* In RRC signalling, Support DL only UM RLC configuiration for PTM, both DL and UL AM RLC configuiration for PTP, DL only UM RLC configuiration for PTP, FFS both DL and UL UM RLC configuiration for PTP.
* FFS whether PDCP SR can be triggered due to bearer type change in RRC signaling and FFS how to tigger PDCP SR if need.
* Will not support PTM deactivation/activation beyond RRC reconfiguration acc to first agreement above (and whatever R1 decides).
* For PTM PDCP state variables setting while configured, the SN part of COUNT values of these variables are set according to the SN of the first received packet (by the UE) and the HFN indicated by the gNB, if needed.
* Initialize the PTM RLC entity for an MRB configuration, the value of RX\_Next\_Highest and RX\_Next\_Reassembly are set according to the SN of the first received packet containing an SN.
* RLC state variables of PTP RLC reception window can be set to initial value, i.e. 0, due to MRB configuration.
* Single bearer ID is used for each Multicast RB. FFS whether DRB ID space can be shared with MRB ID.
* FFS whether to share common LCID space for Multicast PTM and Unicast DTCH. FFS How many PTM LCIDs to be reserved if separate space is used.
* Multicast PTP and Unicast DTCH/DRB share common LCID space.
* Broadcast PTM/MTCH uses reserved LCID(s), which is different than Unicast DTCH/DRB LCID space.
* Broadcast MCCH uses reserved LCID .
* Multiplexing/de-multiplexing of different logical channels associated with the same G-CS-RNTI is supported for NR MBS.
* If Data Inactivity timer is configured, data monitoring is applied both for unicast and MBS multicast (i.e. both PTM and PTP data) (but not MBS broadcast)
* For multicast PTM transmission, Multicast DRX pattern is configured on a per G-RNTI basis (i.e. independent of legacy UE-specific DRX for unicast transmission).
* Legacy UE-specific DRX pattern for unicast is reused for PTP transmission of NR MBS, which means the UE specific DRX pattern are for both unicast services and the MBS PTP bearer of UE
* Multicast long DRX support is baseline for PTM. FFS whether to support optional short DRX or not.
* The Multicast Long DRX operation has to support the following parameters which are similar to the UE-specific DRX for unicast, where the last two parameters are needed if the HARQ- feedback is enabled:

- drx-onDurationTimerPTM

- drx-InactivityTimerPTM

- drx-LongCycleStartOffsetPTM

- drx-SlotOffsetPTM

- drx-HARQ-RTT-TimerDLPTM

- drx-RetransmissionTimerDLPTM

* For NR Broadcast, the DRX pattern is configured per G-RNTI.
* For NR Broadcast, DRX configuration includes: drx-onDurationTimerPTM, drx-SlotOffsetPTM, drx-InactivityTimerPTM, drx-CycleStartOffsetPTM.
* ROHC O/R-mode can be used for MRB, for cases when feedback path is available (UL RLC). R2 assumes the detailed operation is up to implementation and expect no further optimizations to be needed.
* Reflective QoS is not supported for MBS.
* No SDAP header is needed for MBS.
* Add p7 to stage-2 CR discussion

***Service continuity:***

**For IDLE / INACTIVE:**

* The UE is allowed to prioritize the MBS frequency of interest when the cell of the MBS frequency provides MBS SIB carrying the MCCH configuration, as LTE SC-PTM.
* The UE is allowed to prioritize the MBS frequency of interest when the UE is only capable of receiving the MBS service by camping on the MBS frequency, as LTE SC-PTM.
* The UE may consider cell reselection candidate frequencies at which it cannot receive the MBS service to be of the lowest priority during the MBS session, as LTE SC-PTM.
* Working assumption: The mapping between frequency and MBS service ID (e.g. SAI) is provided in the upper layer signalling (e.g. USD), as LTE SC-PTM. (The detailed information included in the upper layer (e.g. USD) is up to the decision of other WGs)
* Send an LS to SA2 and SA4 to check whether the mapping between frequency and MBS service ID (e.g. SAI) is provided in the upper layer signalling (e.g. USD), as LTE SC-PTM.
* The mapping between frequency and MBS service ID (e.g. SAI) is provided in SIB, as LTE SC-PTM. The detailed mapping is pending for the feedbacks of other WGs.
* The mapping between frequency and MBS service ID (e.g. SAI) is allowed to be sent in cells not broadcasting MBS service, as LTE SC-PTM.
* The mapping between frequency and MBS service ID (e.g. SAI) is provided in a new SIB different from the MBS SIB providing the MCCH configuration, as LTE SC-PTM.
* An ID (e.g. SAI) of MBS services is provided in SIB and USD, as LTE SC-PTM. The details of the ID is pending for the feedbacks of other WGs.
* Send an LS to SA2, SA4 and RAN3 to check whether an ID (e.g. SAI) of MBS services can be provided in SIB and USD, as LTE SC-PTM.
* It is FFS whether the gNB may indicate a list of neighbour cells where ongoing broadcast MBS service provided in the current cells are also provided, as LTE SC-PTM.
* The extra offset to cell (which provides the MBS service) for the cell ranking criterion is not supported in Rel-17.

For CONNECTED:

* The UE reports the following MBS interest information (as LTE SC-PTM):

MBS frequency list

priority between the reception of all listed MBMS frequencies and the reception of any unicast bearer

TMGI list

* If MBS frequencies are allowed to be reported, the MBS frequencies reported by the UE is sorted by decreasing order of interest, as LTE SC-PTM.
* Send an LS to SA3 to check whether the MBS interest information can be reported by the UE before security activation.
* FFS whether the MII is reported via *UEAssistanceInformation* or a new RRC message.

***Notification:***

* RAN2 waits for RAN1’s final decision on which RNTI/DCI (i.e. Alt1 and/or Alt 2 as identified by RAN1) for MCCH change notification to be adopted.
* Do not specify any mechanism to address the possibility of UE missing an MCCH change notification and it is left to UE implementation.
* Provided RAN3 confirms, paging for multicast activation notification is used in the relevant legacy POs for the UEs with deactivated multicast session(s).
* RAN2 sends an LS to RAN3 and SA2 to indicate its preference for paging for multicast activation notification to be used in the relevant legacy POs for the UEs with non activated multicast session(s). Further, RAN2 requests RAN3 for confirmation and if so, also specifying required network signalling.
* Confirm extending the unicast paging message to include a new paging record list ( *pagingGroupList)* for group activation notification of multicast sessions.
* NAS is expected to inform UE about multicast session release (e.g. to stop monitoring for multicast session activation).
* It is up to network implementation (e.g. paging repetitions) for addressing scenario of potential notification loss for UEs.
* RAN2 not to prioritize addressing of PRACH capacity issue due to group notification.
* It is FFS that short message or WUS based indication for multicast activation notification in corresponding paging message can be used.
* It is FFS to introduce MBS specific UAC.
* It is FFS on the establishment cause and resume cause for MBS.
* It is FFS if there is a need to prioritize a frequency with multicast support for idle/inactive UEs that monitor multicast activation notification.

***L3 miscellaneous:***

* [049] Send and LS to SA2 to consult on whether TMGI is sufficient for MBS session identification or some additional parameter is required (such as sessionID in LTE).
* [049] There is no SDAP configuration provided to the UE for neither broadcast nor multicast.
* [049] For broadcast, it is FFS whether sn-FieldLength (for RLC) and pdcp-SN-SizeDL parameters are configurable or predefined in specifications (related UE capabilities should be considered).
* [049] For broadcast, it is FFS whether t-Reassembly (in RLC configuration) and t-Reordering (in PDCP configuration) are needed, e.g. considering whether out of sequence reception can happen as there is no HARQ feedback for broadcast.
* [049] For broadcast, it is FFS whether ROHC, when enabled by the network, has a predefined configuration or ROHC parameters are configurable by the network.
* [049] On-demand MCCH mechanism is not introduced in Rel-17.
* [049] A single MCCH channel with multiple modification/repetition periods is not supported, i.e. there is a single configuration of modification/repetition for MCCH (in Rel-17).

#### 2.2.2 Remaining Open issues

* Remaining issues for multicast, including but not limited to:
  + Use cases of PDCP status reporting and retransmission;
  + Remaining issues for mobility support, including mobility between MBS-supporting gNBs, as well as between MBS-supporting and non-MBS-supporting gNBs.
* Remaining issues for broadcast, including but not limited t8o:
  + Service continuity (including MBS Interest Indication, prioritization of cell reselection, and etc.)
  + MCCH content;
* RAN2 aspects of group scheduling, including but not limited to:
  + DRX;
  + SPS;
  + BWP

## 2.3 RAN3

#### 2.3.1 Agreements

In RAN#113-e meeting, 94 contributions [1] ~ [94] were submitted, with the following progress:

* BL CRs endorsed.
* Several TPs agreed to reflect the achieved agreements.
* **Session Management over NG**

Agreements and working assumptions:

* + RAN3 continue the work based on current SA2 agreements, if any issues identified in RAN3 later, LS coordination or companies’ internal coordination with other groups are allowed.
  + **mapped QoS flows**: unicast QoS flows requested to be established, i.e. included in the legacy QoS flow lists in a way, that non-support RAN nodes would attempt to establish unicast QoS flows and supporting RAN nodes can identify them as mapped QoS flows based on the associated QoS information.
  + **associated QoS flow information:** information encompassing: QoS flow QoS parameters for associated QoS flows and mapping information between mapped (unicast) QoS flows and associated QoS flows. The respective information is included in a way that non-supporting RAN nodes would not establish respective RAN resources irrespective the multicast session state.
  + The reference to the MBS Session which the UE has joined. and, if applicable, the associated QoS flow informations, are included in the corresponding PDU Session Resources Item and maintained within the NG-RAN UE Context during active and de-activated MBS sessions. If the (supporting) gNB identifies QoS flows requested to be setup as mapped QoS flows based on information contained in the associated QoS flow information the (supporting) gNB shall not establish unicast resources for those QoS flows. At Xn handover, during an active multicast session, if interworking with non-supporting gNBs is supported in the network, the source node includes both associated QoS flow information and mapped QoS flows within the UE Context in the Handover Request message.
  + **NG RAN MBS Session Resource Context**: Encompasses CP and UP, transport and radio resources to support an MBS Session. For multicast it encompasses also the MBS Session state (active, de-activated) information about joined UEs.
  + Define a gNB triggered class 1 procedure to trigger the setup of NG-U resources.
  + The main application of this procedure is related to setup of NG-U resources.
  + If an MBS Session Resource within a gNB serves multiple MBS service areas, the same NG MBS Session Resource context may be associated with multiple NG-U resources.
  + During an ongoing multicast session, NG-U resources maybe setup or released upon UE mobility by means of a gNB triggered procedure.
  + Introduce a new class 2 procedure for multicast MBS Group Paging in NGAP and XnAP as Multicast Group paging (NGAP) and RAN Multicast Group Paging (XnAP) respectively.
  + The NGAP Multicast Group Paging procedure shall carry the following information: MBS Session ID, MBS Service Area(s), a list of (UE specific paging Identity/Identities or a derived identity/identities. FFS: how to deal with (UE specific) DRX information.
  + Introduce MBS Session and Associated QoS flow information on highest PDU Session information level containing:
    - MBS Session ID.
    - MBS QoS flow ID
    - MBS QoS flow QoS parameters
    - mapped QoS flow ID information
  + Dependent on the transparent SMF PDU Session container where such information is included, addition, modification and release of such information is supported.
  + Include “MBS support information” in relevant NGAP SMF containers which informs the SMF whether the gNB has understood the Rel-17 MBS related information.
  + It is proposed that the “MBS support information” is encoded as an enumeration with one value, e.g. “support”.
  + SMF containers where the “MBS Support information” is include are FFS, but expected for PDU Session Resource Setup Response Transfer, PDU Session Resource Modify Response Transfer, Path Switch Request Transfer, Handover Request Acknowledge Transfer.
  + Handling of “MBS support information” in the relevant SMF containers at handover from non-supporting to supporting gNBs: the supporting RAN node will include the “MBS support information” within transparent SMF containers of all established PDU Session Resources.

Open issues:

* + FFS whether further optimization can be agreed for realizing provisioning associated QoS flow information to the gNB.
  + Whether at Session Activation, multiple NG-U resources, one per service area may be setup is FFS.
  + FFS: applicability of QoS flow related information if interworking with non-supporting gNBs is not supported
* **Dynamic Change Between PTP and PTM for UEs in RRC\_CONNECTED State**

Agreements and working assumptions:

* + WA: For the RAN2 agreed split MRB bearer with a common PDCP: the decision of using PTP (RLC leg) or PTM (RLC leg) is made by the gNB-DU
  + In the current RAN2/3 concept the DU does not notify the CU about the DUs (PTP/PTM) decision.
  + A shared F1-U tunnel is established between gNB-CU and gNB-DU for PTP/PTM transmission associated with split MRB with common PDCP.
* **Bearer Management over F1/E1**

Agreements and working assumptions:

- Definitions

* + MBS Session Context residing in the DU, applicable for BC and MC, which may consist of one or several MRB Contexts.
  + Each MRB Context corresponds to:
    - Either one or several F1-U tunnels
    - One or several MRBs (MRB “instances”), each with a potentially different Uu configuration to be incorporated into each UE’s individual *CellGroupConfig* for MC, that RRC container needs to be provided to the CU per MRB “instance”) for individual RRCReconfiguration.
  + The DU sets up MRB resources upon the following information:
    - For MC: based on Knowledge of RRC\_CONNECTED UEs being present (derived from MBS Session ID in UE contexts)
    - For BC and MC: Provided within MBS Session Context related information from CU->DU (MRB QoS etc, service area(s))

- F1-U tunnel and flow control

* + WA: For Broadcast and Multicast, optional use of DL flow control in the shared F1-U tunnel.
  + WA: For split MRB with common PDCP, shared F1-U tunnel is used, existing NR user plane protocol functions need to be reviewed for their applicability for MBS.

- Context/Bearer Management

* + For broadcast, introduce gNB-CU-CP triggered F1AP procedures: MBS Context Setup, MBS Context Modification, MBS Context Release. Detailed naming FFS.
  + For broadcast, introduce gNB-CU-CP triggered E1AP procedures: MBS Bearer Setup, MBS Bearer Modification, MBS Bearer Release. Detailed naming FFS.
  + For broadcast, the shared NG-U tunnel is established during the CU-CP triggered E1AP: MBS Bearer Setup procedure. The IP multicast address could be included in the E1AP: MBS Bearer Setup Request, and the unicast transport DL NG-U GTP-U address could be included in the E1AP: MBS Bearer Setup Response.
  + For broadcast, the shared F1-U tunnel is established during the procedures to setup the broadcast context and bearer.
  + WA: For Multicast, reuse the existing UE-associated F1AP procedures to provide per UE the joined MBS Session IDs, further FFS UE specific MBS information and MBS context information (FFS).
  + The gNB-DU assigns the G-RNTI.
  + Encoding of the L1/L2 related configuration part of the MCCH configuration related SIB follows the current work split between CU and DU, further F1 signalling details are FFS
* **Broadcast/multicast Area**

Agreements and working assumptions:

* + WA: A list of IDs (e.g. SAI) may be used for identifying MBS service area of a broadcast session, pending to RAN2 agreement.
  + The basic principle for Xn-based handover of UEs receiving multicast service available within a limited area:

1. The Source gNB provides the MBS service area information (e.g. cell list or tracking area list) to target gNB in Handover Request message as a part of MBS session related information. or, alternatively (2) the source gNB may deduce that the target not in the MBS service area anymore and not provide MBS session related information at all.

for (1), The target gNB may perform MBS session admission control according to the MBS service area information.

or (1), If the UE is no longer in the MBS service area in the target gNB, the target gNB does not establish the MBS session.

* + WA: For broadcast session, the LTE mechanism on MBS frequency layer prioritization shall be revisited for NR, if MBS frequency layer prioritization is supported by RAN2.
  + WA: If SAI/ID is used to identify an MBS service area, it may be configured by OAM.
* **Mobility Between MBS Supporting Nodes**

Agreements and working assumptions:

* + Source and target gNBs derive synchronized PDCP SN from sequence number and the solution is FFS.

Open issues:

* + FFS: whether it is necessary to exchange SN Status for MRBs between source and target gNB, and if so, how to design stage 3 and how to stop data forwarding.
  + FFS: In R17, lossless handover is supported only for one-to-one mapping between MBS flow and MRB, based on flow level sequence number in NG-U
* **Mobility Between MBS Supporting and non-MBS Supporting Nodes**

Agreements and working assumptions:

* + MBS support Indicator is included in Path Switch Request Transfer sent by an MBS supporting node to indicate support
  + Capture an editor’s note in BL CR 38.300: “whether other options for mobility from supporting to non-supporting nodes are specified to fulfil lossless data forwarding is FFS”

#### 2.3.2 Remaining Open issues

* Session management over NG.
* MBS Bearer management over F1 and E1.
* Mobility with Service Continuity for UEs in RRC\_CONNECTED State.

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

RAN1#106e contributions:

1. R1-2106438 Resource configuration and group scheduling for RRC\_CONNECTED UEs Huawei, HiSilicon, CBN
2. R1-2106623 Discussion on mechanisms to support group scheduling for RRC\_CONNECTED Ues vivo
3. R1-2106662 Group Scheduling Mechanisms to Support 5G Multicast / Broadcast Services for RRC\_CONNECTED Ues Nokia, Nokia Shanghai Bell
4. R1-2106716 Discussion on MBS group scheduling for RRC\_CONNECTED UEs Spreadtrum Communications
5. R1-2106745 Discussion on Mechanisms to Support Group Scheduling for RRC\_CONNECTED UEs ZTE
6. R1-2106820 Considerations on MBS group scheduling for RRC\_CONNECTED UEs Sony
7. R1-2106912 Support of group scheduling for RRC\_CONNECTED Ues Samsung
8. R1-2106945 Discussion on group scheduling mechanism for RRC\_CONNECTED UEs in MBS CATT
9. R1-2106996 Common frequency resource configuration for multicast of RRC\_CONNECTED Ues ETRI
10. R1-2107093 Group Scheduling Aspects for Connected UEs FUTUREWEI
11. R1-2107137 Discussion on Group Scheduling Mechanisms for RRC\_CONNECTED Ues NEC
12. R1-2107160 On group scheduling mechanism for NR MBS Lenovo, Motorola Mobility
13. R1-2107201 Discussion on group scheduling mechanisms for RRC\_CONNECTED UEs Potevio Company Limited
14. R1-2107229 Discussion on group Scheduling mechanism for RRC\_CONNECTED UEs OPPO
15. R1-2107369 Views on group scheduling for Multicast RRC\_CONNECTED UEs Qualcomm Incorporated
16. R1-2107382 Discussion on group scheduling mechanism for RRC\_CONNECTED UEs Google Inc.
17. R1-2107425 Discussion on group scheduling mechanisms CMCC
18. R1-2107456 Support of group scheduling for RRC\_CONNECTED UEs LG Electronics
19. R1-2107514 Discussion on NR MBS group scheduling for RRC\_CONNECTED UEs MediaTek Inc.
20. R1-2107611 NR-MBS Group Scheduling for RRC\_CONNECTED UEs Intel Corporation
21. R1-2107763 Discussion on group scheduling mechanism for RRC\_CONNECTED Ues Apple
22. R1-2107881 Discussion on group scheduling mechanism for RRC\_CONNECTED UEs NTT DOCOMO, INC.
23. R1-2107902 Discussion on mechanisms to support group scheduling for RRC\_CONNECTED UE Xiaomi
24. R1-2107950 Group scheduling related discussion for RRC\_CONNECTED UEs CHENGDU TD TECH LTD.
25. R1-2108026 Discussion on group scheduling mechanism for RRC\_CONNECTED UEs Convida Wireless
26. R1-2108046 Discussion on mechanisms to support group scheduling for RRC\_CONNECTED UEs ASUSTeK
27. R1-2108170 Mechanisms to support MBS group scheduling for RRC\_CONNECTED Ues Ericsson
28. R1-2107424 Summary#1 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
29. R1-2108308 Summary#2 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
30. R1-2108359 Summary#3 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
31. R1-2108368 Summary#4 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
32. R1-2108428 Summary#5 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
33. R1-2108459 Summary#6 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
34. R1-2108471 Summary#6 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
35. R1-2108549 Summary#7 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
36. R1-2108574 Summary#8 on mechanisms to support group scheduling for RRC\_CONNECTED UEs for NR MBS Moderator (CMCC)
37. R1-2106439 Mechanisms to improve reliability for RRC\_CONNECTED UEs Huawei, HiSilicon, CBN
38. R1-2106624 Discussion on mechanisms to improve reliability for RRC\_CONNECTED Ues vivo
39. R1-2106663 Reliability Improvements for RRC\_CONNECTED UEs Nokia, Nokia Shanghai Bell
40. R1-2106717 Mechanisms to improve MBS reliability for RRC\_CONNECTED Ues Spreadtrum Communications
41. R1-2106746 Discussion on Mechanisms to Improve Reliability for RRC\_CONNECTED UEs ZTE
42. R1-2106913 On mechanisms to improve reliability for RRC\_CONNECTED UEs Samsung
43. R1-2106946 Discussion on reliability improvement mechanism for RRC\_CONNECTED UEs in MBS CATT, CBN
44. R1-2106997 HARQ-ACK feedback scheme for multicast of RRC\_CONNECTED Ues ETRI
45. R1-2107094 Further Discussions on Reliability for RRC\_CONNECTED UEs FUTUREWEI
46. R1-2107138 Discussion on Reliability Improvements for RRC\_CONNECTED UEs NEC
47. R1-2107161 On reliability improvement for RRC-CONNECTED UEs Lenovo, Motorola Mobility
48. R1-2107230 UL feedback for RRC-CONNECTED UEs in MBS OPPO
49. R1-2107370 Views on UE feedback for Multicast RRC\_CONNECTED UEs Qualcomm Incorporated
50. R1-2107383 Discussion on MBS reliability for RRC\_CONNECTED UEs Google Inc.
51. R1-2107426 Discussion on reliability improvement CMCC
52. R1-2107457 Mechanisms to improve reliability of Broadcast/Multicast service LG Electronics
53. R1-2107515 Discussion on mechanisms to improve reliability for RRC\_CONNECTED UEs MediaTek Inc.
54. R1-2107612 Mechanisms to Improve Reliability of NR-MBS for RRC\_CONNECTED UEs Intel Corporation
55. R1-2107764 Discussion on MBS reliability improvement for RRC\_CONNECTED UEs Apple
56. R1-2107882 Discussion on mechanisms to improve reliability for multicast for RRC\_CONNECTED UEs NTT DOCOMO, INC.
57. R1-2107951 Reliability related discussion for RRC\_CONNECTED UEs CHENGDU TD TECH LTD.
58. R1-2108027 Discussion on reliability enhancement for RRC\_CONNECTED UEs Convida Wireless
59. R1-2108171 Mechanisms to improve reliability for RRC\_CONNECTED Ues Ericsson
60. R1-2108285 FL summary#1 on improving reliability for MBS for RRC\_CONNECTED UEs Moderator (Huawei)
61. R1-2108332 FL summary#2 on improving reliability for MBS for RRC\_CONNECTED UEs Moderator (Huawei)
62. R1-2108372 FL summary#3 on improving reliability for MBS for RRC\_CONNECTED UEs Moderator (Huawei)
63. R1-2108429 FL summary#4 on improving reliability for MBS for RRC\_CONNECTED UEs Moderator (Huawei)
64. R1-2108481 FL summary#5 on improving reliability for MBS for RRC\_CONNECTED UEs Moderator (Huawei)
65. R1-2108553 FL summary#6 on improving reliability for MBS for RRC\_CONNECTED UEs Moderator (Huawei)
66. R1-2106440 Discussion on UE receiving broadcast in RRC IDLE/INACTIVE state Huawei, HiSilicon, CBN
67. R1-2106625 Discussion on basic functions for broadcast multicast for RRC\_IDLE RRC\_INACTIVE UEs vivo
68. R1-2106664 Basic Functions for Broadcast / Multicast for RRC\_IDLE / RRC\_INACTIVE Ues Nokia, Nokia Shanghai Bell
69. R1-2106718 Basic Functions for Broadcast or Multicast for RRC\_IDLE or RRC\_INACTIVE UEs Spreadtrum Communications
70. R1-2106747 Discussion on basic Functions for Broadcast or Multicast for RRC\_IDLE or RRC\_INACTIVE UEs ZTE
71. R1-2106821 Considerations on MBS functions for RRC\_IDLE/INACTIVE UEs Sony
72. R1-2106914 On basic functions for broadcast/multicast for RRC\_IDLE/RRC\_INACTIVE UEs Samsung
73. R1-2106947 Discussion on basic functions for broadcast/multicast for RRC\_IDLE/RRC\_INACTIVE UEs CATT, CBN
74. R1-2107095 MBS Support for RRC IDLE/INACTIVE UEs FUTUREWEI
75. R1-2107162 Basic functions for broadcast/multicast in idle/inactive states Lenovo, Motorola Mobility
76. R1-2107165 Search Space and DCI Design for MBS in IDLE and INACTIVE states TCL Communication Ltd.
77. R1-2107231 Discussion on basic functions for RRC\_IDLE/RRC\_INACTIVE UEs OPPO
78. R1-2107371 Views on group scheduling for Broadcast RRC\_IDLE/INACTIVE UEs Qualcomm Incorporated
79. R1-2107384 Discussion on MBS for RRC\_IDLE/RRC\_INACTIVE UEs Google Inc.
80. R1-2107427 Discussion on NR MBS in RRC\_IDLE/ RRC\_INACTIVE states CMCC
81. R1-2107458 Basic function for broadcast/multicast LG Electronics
82. R1-2107516 Discussion on MBS for RRC\_IDLE/INACTIVE UEs MediaTek Inc.
83. R1-2107613 NR-MBS for RRC\_IDLE/INACTIVE UEs Intel Corporation
84. R1-2107765 Discussion on MBS for RRC\_IDLE and RRC\_INACTIVE UEs Apple
85. R1-2107883 Discussion on basic functions for broadcast/multicast for RRC\_IDLE/RRC\_INACTIVE UEs NTT DOCOMO, INC.
86. R1-2107952 NR MBS related discussion for RRC\_IDLE/RRC\_INACITVE UEs CHENGDU TD TECH LTD.
87. R1-2108028 Discussion on MBS for RRC\_IDLE/RRC\_INACTIVE UEs Convida Wireless
88. R1-2108172 Support for NR multicast reception in RRC Inactive/Idle Ericsson
89. R1-2108227 Feature Lead summary #1 on RAN basic functions for broadcast/multicast for UEs in RRC\_IDLE/RRC\_INACTIVE states Moderator (BBC)
90. R1-2108228 Feature Lead summary #2 on RAN basic functions for broadcast/multicast for UEs in RRC\_IDLE/RRC\_INACTIVE states Moderator (BBC)
91. R1-2108229 Feature Lead summary #3 on RAN basic functions for broadcast/multicast for UEs in RRC\_IDLE/RRC\_INACTIVE states Moderator (BBC)
92. R1-2108230 Feature Lead summary #4 on RAN basic functions for broadcast/multicast for UEs in RRC\_IDLE/RRC\_INACTIVE states Moderator (BBC)
93. R1-2108578 Feature Lead summary #5 on RAN basic functions for broadcast/multicast for UEs in RRC\_IDLE/RRC\_INACTIVE states Moderator (BBC)
94. R1-2108579 Feature Lead summary #6 on RAN basic functions for broadcast/multicast for UEs in RRC\_IDLE/RRC\_INACTIVE states Moderator (BBC)

RAN2#115e contributions:

1. R2-2107013 Discussion on MBS interesting indication for delivery mode 2 OPPO
2. R2-2107014 Discussion on beam sweeping transmission for delivery mode 2 OPPO
3. R2-2107015 Discussion on MCCH change notification OPPO
4. R2-2107016 Group notification and unicast paging for MBS activation OPPO
5. R2-2107017 Discussion on MBS service continuity for delivery mode 2 OPPO
6. R2-2107032 Open Issues on Mobility of Delivery Mode 1 CATT, CBN
7. R2-2107033 PTM/PTP Switch CATT
8. R2-2107034 Discussion on Scheduling and Power Saving of MBS CATT
9. R2-2107035 Open Issues on Service Continuity of Delivery Mode 2 CATT, CBN
10. R2-2107036 On Multicast Activation Notification CATT, CBN
11. R2-2107037 Open Issues on MCCH Change Notification CATT
12. R2-2107038 Discussion on MCCH Contents and General RRC Aspects CATT, CBN
13. R2-2107048 Mobility and Service continuity for NR Multicast MediaTek Inc.
14. R2-2107049 DRX scheme for NR MBS MediaTek Inc.
15. R2-2107050 Broadcast Service Continuity MediaTek Inc.
16. R2-2107051 Notification for Multicast activation MediaTek Inc.
17. R2-2107052 MCCH Configuration MediaTek Inc.
18. R2-2107119 PTM PTP switch and reliability MediaTek Inc.
19. R2-2107120 Initialization of RLC and PDCP windows MediaTek Inc.
20. R2-2107204 Service continuity for MBS due to handover OPPO
21. R2-2107205 Discussion on group-based scheduling for MBS OPPO
22. R2-2107206 [Post114-e][072][MBS] Delivery Mode 1 PTM PTP operation (OPPO) OPPO
23. R2-2107233 MBS Power Saving and Scheduling Aspects Samsung
24. R2-2107234 On Broadcast Service Continuity Samsung
25. R2-2107235 Considerations on Notifications for Multicast and Broadcast Samsung
26. R2-2107236 MCCH Contents and RRC Aspects for MBS Samsung
27. R2-2107335 Discussion on lossless mobility support for NR MBS ZTE, Sanechips
28. R2-2107336 Multicast Service Continuity ZTE, Sanechips
29. R2-2107337 Group scheduling and power saving for NR MBS ZTE, Sanechips
30. R2-2107338 Miscellaneous L2 centric issues on NR MBS ZTE, Sanechips
31. R2-2107339 Broadcast Service Continuity ZTE, Sanechips
32. R2-2107340 Notifications for NR MBS ZTE, Sanechips
33. R2-2107341 MCCH contents for NR MBS ZTE, Sanechips
34. R2-2107363 Discussion on Multicast service continuity during mobility Spreadtrum Communications
35. R2-2107364 Discussion on issues of delivery mode2 Spreadtrum Communications
36. R2-2107365 Discussion on multicast activation notification Spreadtrum Communications
37. R2-2107366 RRC issues of multicast session Spreadtrum Communications
38. R2-2107387 Discussion on Service Continuity Support for NR MBS TCL Communication Ltd.
39. R2-2107438 Consideration on dynamic PTM and PTP switching for NR MBS Shanghai Jiao Tong University
40. R2-2107439 Deactivation and reactivation of MBS reception Shanghai Jiao Tong University
41. R2-2107446 MBS group scheduling and power saving Intel Corporation
42. R2-2107467 Determination of HARQ retransmission for PTM FGI, Asia Pacific Telecom
43. R2-2107529 Configurations for MRB and scheduling via MCCH in DM2 Futurewei
44. R2-2107530 Further discussion on the MBS group notification in DM2 Futurewei
45. R2-2107531 Handling MBS during conditional handover Futurewei
46. R2-2107539 L2 ARQ by PDCP for PTM Futurewei, Qualcomm Inc., Intel, UIC, Kyocera, NEC, Samsung, Ericsson
47. R2-2107544 PDCP Functionality during Mobility and PTM-PTP Switch Futurewei
48. R2-2107545 NR Multicast DRX aspects Qualcomm India Pvt Ltd
49. R2-2107546 NR MBS control signalling aspects for UEs in different RRC states Qualcomm Inc
50. R2-2107547 NR Multicast and Broadcast Radio Bearer Architecture aspects Qualcomm Inc
51. R2-2107548 NR Multicast Broadcast mobility enhancements with service continuity Qualcomm Inc
52. R2-2107576 PTM and PTP switch with MBS service continuity Apple
53. R2-2107577 DRX mechanism for MBS PTM reception Apple
54. R2-2107578 Access Control for the MBS Service Reception Apple
55. R2-2107579 MBS reception in CONNECTED state Apple
56. R2-2107657 PTP UM RLC configuration Fujitsu
57. R2-2107682 DRX for PTM and PTP TCL Communication Ltd.
58. R2-2107685 Dynamic PTM PTP Switch TCL Communication Ltd.
59. R2-2107690 MBS Reliability Nokia, Nokia Shanghai Bell
60. R2-2107691 Miscellaneous Aspects of MBS Provisioning Nokia, Nokia Shanghai Bell
61. R2-2107692 MBS Mobility Nokia, Nokia Shanghai Bell
62. R2-2107693 Draft LS on MBS mobility Nokia, Nokia Shanghai Bell
63. R2-2107694 DRX for Multicast Nokia, Nokia Shanghai Bell
64. R2-2107696 IDLE /IN\_ACTIVE UE support of MBS NEC
65. R2-2107697 Reliability of NR MBS NEC
66. R2-2107698 Service Continuity for Connected mode UE NEC
67. R2-2107699 Simultaneous transmission of multicast/unicast NEC
68. R2-2107702 MBS L2 reliability NEC
69. R2-2107703 Service Continuity for Connected mode UE NEC
70. R2-2107787 Notification of the Activation/Deactivation of PTM SHARP Corporation
71. R2-2107793 Service Continuity during Inter-cell mobility vivo
72. R2-2107794 CHO and DAPS for NR MBS vivo
73. R2-2107795 Discussion on PTP PTM Switch vivo
74. R2-2107796 Further Considerations on Group Scheduling for MBS vivo
75. R2-2107797 PDCP and RLC Initialization for MBS Reception vivo
76. R2-2107798 Discussion on Broadcast Service Continuity vivo
77. R2-2107799 Discussion on MBS Notification and MCCH vivo
78. R2-2107875 MBS service continuity LG Electronics Inc.
79. R2-2107876 MCCH information acquisition LG Electronics Inc.
80. R2-2107877 RRC connection establishmentresume initiated by group paging LG Electronics Inc.
81. R2-2107919 Discussion on MRB type change and PTM/PTP switch Lenovo, Motorola Mobility
82. R2-2107920 MBS specific DRX operation and Data Inactivity Monitoring Lenovo, Motorola Mobility
83. R2-2107921 Service Continuity for handover from MBS Supporting Node to MBS non-Supporting Node Lenovo, Motorola Mobility
84. R2-2107922 Notification for Multicast activation Lenovo, Motorola Mobility
85. R2-2107931 MBS Group Scheduling Samsung
86. R2-2107932 Service Continuity for Multicast Samsung
87. R2-2107933 Layer-2 Aspects for MBS Samsung
88. R2-2107981 MCCH considerations Nokia, Nokia Shanghai Bell
89. R2-2107982 MBS session activation and group paging Nokia, Nokia Shanghai Bell
90. R2-2107999 Details of control plane aspects for delivery mode 2 in NR MBS Kyocera
91. R2-2108000 Remaining issues of dynamic PTM - PTP switching and mobility for NR MBS Kyocera
92. R2-2108001 Group notification for Delivery mode 1 in NR MBS Kyocera
93. R2-2108002 Open issues on group scheduling for NR MBS Kyocera
94. R2-2108032 Service continuity for delivery mode 1 CHENGDU TD TECH LTD.
95. R2-2108033 Scheduling for NR MBS CHENGDU TD TECH LTD.
96. R2-2108034 Service continuity for delivery mode 2 CHENGDU TD TECH LTD.
97. R2-2108035 Discussion on notificatons for NR MBS CHENGDU TD TECH LTD.
98. R2-2108036 MBS related configuration for delivery mode 2 CHENGDU TD TECH LTD.
99. R2-2108037 General aspects for NR MBS CHENGDU TD TECH LTD.
100. R2-2108040 CQI audit procedure for delivery mode 2 TD Tech
101. R2-2108049 MBS BWP UE capability and MBS resources Sony
102. R2-2108050 Need for L2 ARQ for PTM to PTP switch Sony
103. R2-2108078 Aspects on notification Ericsson
104. R2-2108079 Aspects on Power Saving Ericsson
105. R2-2108080 Reliability for Multicast and for Multicast Service Continuity Ericsson
106. R2-2108081 Open issues in Broadcast Service Continuity Ericsson
107. R2-2108082 Initialization of RLC and PDCP window Ericsson
108. R2-2108083 Aspects on Scheduling Ericsson
109. R2-2108084 Other aspects for MBS Ericsson
110. R2-2108123 Support of dynamic switch Huawei, HiSilicon
111. R2-2108124 Inter-cell mobility for MBS Huawei, HiSilicon
112. R2-2108125 Discussion on group scheduling Huawei, HiSilicon
113. R2-2108126 Initialization of RLC and PDCP windows Huawei, HiSilicon
114. R2-2108201 Remaining issues of MBS Interest Indication Huawei, HiSilicon
115. R2-2108202 Notifications for Multicast and Broadcast Huawei, HiSilicon
116. R2-2108203 MCCH acquisition in RRC\_CONNECTED state Huawei, HiSilicon
117. R2-2108204 Summary of e-mail discussion “[Post114-e][074][MBS] RRC running CR” and RRC open issues list Huawei, HiSilicon
118. R2-2108205 38.331 running CR for NR MBS Huawei, HiSilicon
119. R2-2108455 Multicast activation notification and MCCH change notification Intel Corporation
120. R2-2108456 Details for MCCH design Intel Corporation
121. R2-2108479 Power saving for MBS PTM ETRI
122. R2-2108485 Lossless PTM/PTP switching InterDigital
123. R2-2108486 PTM activation and deactivation InterDigital
124. R2-2108487 On RLC receiver state variables during PTM/PTP switching InterDigital
125. R2-2108519 Discussion on dynamic PTP/PTM switch CMCC
126. R2-2108520 Discussion on group scheduling CMCC
127. R2-2108521 Discussion on MBS UP design CMCC
128. R2-2108522 Discussion on Broadcast service continuity issues CMCC
129. R2-2108523 Discussion MBS notification schemes CMCC
130. R2-2108550 Discussion on multicast service continuity LG Electronics Inc.
131. R2-2108551 Discussion on group scheduling and power saving LG Electronics Inc.
132. R2-2108552 Discussion on MRB related issues and others LG Electronics Inc.
133. R2-2108654 Discussion on MCCH CHENGDU TD TECH LTD.
134. R2-2108676 Multicast service continuity in mobility and PTM/PTP switching Intel Corporation
135. R2-2108677 Service continuity for delivery mode 2 Intel Corporation
136. R2-2108708 UE stay in RRC\_CONNECTED when no MBS data ongoing ASUSTeK
137. R2-2108754 Activation and Deactivation of PTM/PTP leg Convida Wireless
138. R2-2108796 Discussion on MBS support on MRDC Xiaomi Communications
139. R2-2108797 Remaining PDCP issues for MBS Xiaomi Communications
140. R2-2108798 Discussion on the group scheduling of MBS Xiaomi Communications
141. R2-2108799 Summary of [Post114-e][073][MBS] Service continuity for Delivery Mode 2 (Xiaomi) Xiaomi Communications
142. R2-2108800 PRACH congestion due to multicast paging Xiaomi Communications
143. R2-2108809 Discussion on definition of PTM transmission considering HARQ for PTM LG Electronics Inc.
144. R2-2108846 [Pre115-e][001][MBS] Summary 8.1.2.2 L2 Centric Scheduling and PowSav (Qualcomm) Qualcomm
145. R2-2108847 Summary 8.1.3.2 - L3 Centric Notifications (Samsung) Samsung
146. R2-2109022 Inter-cell mobility for MBS Huawei, HiSilicon
147. R2-2109026 Summary of [Pre115-e][002] [MBS] 8.1.2.3 L2 Centric Other MediaTek Inc.
148. R2-2109035 [Pre115-e][004][MBS] Summary 8.1.3.3 L3 Centric Other Huawei, HiSilicon
149. R2-2109041 Report of [AT115-e][047][MBS] Service Continuity deliver mode 2 Xiaomi Communications
150. R2-2109052 Report of [AT115-e][047][MBS] Service Continuity deliver mode 2 Xiaomi Communications
151. R2-2109078 Report of [AT115-e][048][MBS] Notifications (Samsung) Samsung
152. R2-2109104 Report of offline: [AT115-e][049][MBS] L3 Other (Huawei) Huawei, HiSilicon
153. R2-2109177 LS on paging for multicast session activation notification RAN2

RAN3#113e contributions:

1. R3-213138 Introduction of MBS(BL CR for 38.463) CATT
2. R3-213139 Introduction of NR MBS Lenovo, Motorola mobility
3. R3-213147 Introduction of NR MBS Samsung
4. R3-213150 Introduction of NR MBS LG Electronics
5. R3-213240 (TP for TS 38.300) Mobility with non-MBS supporting NG-RAN nodes ZTE
6. R3-213374 Data forwarding in handover with MBS multicast Qualcomm Incorporated, Huawei, Samsung, Lenovo, Nokia, Nokia Shanghai Bell, CATT, CMCC, LG Electronics, CBN
7. R3-213457 (TP for 38.300& 38.410) Stage 2 for Multicast and Broadcast Nokia, Nokia Shanghai Bell
8. R3-213459 (TP for 38.413) Stage 3 for MBS Context and UE MBS Context Nokia, Nokai Shanghai Bell
9. R3-213460 (TP for 38.413) Stage 3 for User Plane Shared Delivery Tunnel Nokia, Nokia Shanghai Bell
10. R3-213461 (TP for 38.415) Seamless Mobility between two MBS Supporting Nodes and use of data forwarding Nokia, Nokia Shanghai Bell
11. R3-213462 (TP for 38.300) MBS Stage 2 for Mobility between MBS supporting nodes Nokia, Nokia Shanghai Bell
12. R3-213464 (TP for 38.300) Stage 2 for Broadcast Continuity Nokia, Nokia Shanghai Bell
13. R3-213544 Consideration on Flow Control Mechanism over F1-U(TP to BLCR of TS 38.425) CATT,CBN
14. R3-213545 Consideration on MBS Session Management at F1E1 interface(TP to TS 38.473 and TS 38.463) CATT,CBN
15. R3-213546 Remaining Issues on MBS Service Continuity for Broadcast Session CATT,CBN
16. R3-213547 TP for 38.413 on session management for broadcast CATT,CBN,Huawei
17. R3-213548 Discussion on MBS session management for multicast CATT,CBN
18. R3-213549 Discussion on dynamic change between PTM and PTP CATT
19. R3-213550 Supporting lossless handover while retaining flexible MRB mapping CATT
20. R3-213551 LS on aligning MRB PDCP Count among multiple gNBs CATT
21. R3-213552 TP on TS 38.300 on multicast lossless handover CATT
22. R3-213555 Consideration on Multicast Session Management Huawei, CBN, China Unicom, Lenovo, Motorola Mobility, Qualcomm Incorporated, China Telecom
23. R3-213557 (TP to TS 38.413 BL CR) Multicast Session Management Huawei, CMCC, Lenovo, Motorola Mobility, Qualcomm Incorporated
24. R3-213579 (TP to TS 38.425 BL CR) Flow Control for MBS Huawei, CBN, China Telecom
25. R3-213590 [TP for BL CR 38.300] Orderly specification work for NR MBS Session Management Ericsson
26. R3-213591 [TP for BL CR 38.413 and 38.423] Orderly specification work for NR MBS Session Management Ericsson
27. R3-213592 [TP for BL CR for 38.401] On F1 and E1 protocol aspects for NR MBS Ericsson
28. R3-213593 [TP for BL CR for 38.473 and 38.463] On F1 and E1 protocol aspects for NR MBS Ericsson
29. R3-213594 On mobility between gNBs supporting NR MBS Ericsson
30. R3-213595 [TP for BL CR TS 38.401 and 38.463] HO between supporting gNBs Ericsson
31. R3-213596 On open items concerning handover between gNBs supporting NR MBS and gNBs not supporting NR MBS Ericsson
32. R3-213651 Group Paging for MBS Multicast Qualcomm Incorporated
33. R3-213706 F1 tunnel and flow control for MBS Samsung
34. R3-213707 TP for TS38.473 BL: Introduction of NR MBS Samsung
35. R3-213708 TP for TS38.463 BL: Addition of session management procedure Samsung
36. R3-213738 Enhancements to support loss-less handover for NR multicast Lenovo, Motorola Mobility
37. R3-213739 Mobility between MBS Supporting and non-Supporting nodes Lenovo, Motorola Mobility
38. R3-213740 Remaining Issues on MBS Service Area Management Lenovo, Motorola Mobility
39. R3-213741 Bearer Management over F1/E1 for Multicast Session Lenovo, Motorola Mobility
40. R3-213742 MCCH Configuration and MCCH Contents Delivery over F1 Lenovo, Motorola Mobility
41. R3-213743 Discussion on Group paging for Multicast Session Activation Notification Lenovo, Motorola Mobility
42. R3-213746 (TP to TS 38.460 BL CR) Support of Multicast Distribution Setup and Release Lenovo, Motorola Mobility, Huawei, Qualcomm Incorporated
43. R3-213747 (TP to TS 38.463 BL CR) Support of Multicast Distribution Setup and Release Lenovo, Motorola Mobility, Huawei, Qualcomm Incorporated
44. R3-213768 Discussion on multicast MBS group paging LG Electronics
45. R3-213769 (TP for NR\_MBS BL CR for TS 38.413) Discussion on multicast MBS group paging LG Electronics
46. R3-213770 (TP for NR\_MBS BL CR for TS 38.473) Discussion on multicast MBS group paging LG Electronics
47. R3-213771 Discussion on switching decision between PTP and PTM LG Electronics
48. R3-213788 (TP for TS 38.413) Management of multicast session ZTE
49. R3-213789 (TP for TS 38.410) Management of multicast session ZTE
50. R3-213790 Discussion on MBS establishment and mobility in case of common gNB-CU-UP deployment ZTE
51. R3-213832 Mode switching for NR MBS ZTE
52. R3-213833 F1-U tunnel and flow control for NR MBS ZTE
53. R3-213834 NR MBS Lossless handover for inter-gNB scenario ZTE
54. R3-213835 Discussion on MBS mobility procedure ZTE
55. R3-213986 (TP to TS 38.300 BL CR) Mobility between MBS supporting nodes Huawei, CBN, China Unicom, China Telecom
56. R3-213987 (TP to TS38.300 BL CR) Consideration on DL PDCP Synchronization Huawei, CBN, China Unicom, China Telecom
57. R3-213988 (TP to TS 38.300 BL CR) Mobility between MBS supporting and non-supporting nodes Huawei, CBN, China Unicom, China Telecom
58. R3-213989 (TP to TS 38.415 BL CR) Support of NR MBS data transmission Huawei, CBN, China Telecom
59. R3-213990 (TP to TS 38.300 BL CR) Broadcast service continuity Huawei, CBN, China Telecom
60. R3-213991 Effects of NR MBS related network planning on NG-RAN architecture CHENGDU TD TECH LTD.
61. R3-214030 Issues on Mobility between MBS Supporting Nodes LG Electronics
62. R3-214094 Discussion on dynamic change between PTP and PTM CMCC
63. R3-214095 Discussion on MBS Bearer Management CMCC
64. R3-214096 Discussion on Mobility with Service Continuity CMCC
65. R3-214097 Discussion on PDCP Synchronization CMCC
66. R3-214098 Discussion on Mobility between non-MBS supporting node and MBS supporting node CMCC
67. R3-214119 MBS Session management over NG for multicast CMCC
68. R3-214120 (TP to TS 38.410 ) MBS session management over NG CMCC
69. R3-214121 (TP to TS 38.300 ) MBS session management over NG CMCC, Huawei
70. R3-214211 CB: # MBS1\_BLCRs - Summary of email discussion LG Electronics - moderator
71. R3-214215 CB: # MBS5\_ServiceAreaMgmt - Summary of email discussion Lenovo - moderato
72. R3-214239 Way Forward on Mobility between MBS supporting nodes Huawei, Qualcomm Incorporated, CMCC, Lenovo, Nokia, Nokia Shanghai Bell, CBN, China Telecom, CATT, LG Electronics, Samsung, China Unicom, BT, vivo
73. R3-214305 CB: # MBS2\_SessMgmt - Summary of email discussion Ericsson - moderator
74. R3-214306 CB: # MBS3\_PTPMSwitch - Summary of email discussion Samsung - moderator
75. R3-214307 CB: # MBS4\_BearerMgmt - Summary of email discussion Huawei - moderator
76. R3-214308 CB: # MBS7\_MobilityNonSupporting - Summary of email discussion Nokia - moderator
77. R3-214359 CB: # MBS6\_MobilitySupporting - Summary of email discussion Qualcomm - moderator
78. R3-214378 (TP to TS 38.420 BL CR) Group paging for Multicast Session Activation Notification Lenovo, Motorola Mobility, Huawei, Nokia, Nokia Shanghai Bell, CMCC
79. R3-214379 (TP to TS 38.423 BL CR) Group paging for Multicast Session Activation Notification Lenovo, Motorola Mobility, Huawei, Nokia, Nokia Shanghai Bell, CMCC
80. R3-214381 (TP to TS 38.410 BL CR) Multicast Group Paging Huawei, CBN, China Unicom, Lenovo, Motorola Mobility, Qualcomm Incorporated, China Telecom, Nokia, Nokia Shanghai Bell, CMCC
81. R3-214382 (TP to TS 38.401 BL CR) Bearer management over F1 and E1 Huawei, CBN, China Telecom, , Nokia, Nokia Shanghai Bell
82. R3-214383 (TP to TS 38.470 BL CR) Multicast Group Paging Qualcomm Incorporated, Huawei, Lenovo, Motorola Mobility, Nokia, Nokia Shanghai Bell
83. R3-214384 (TP to TS 38.473 BL CR) Multicast Group Paging Qualcomm Incorporated, Huawei, Lenovo, Motorola Mobility, Nokia, Nokia Shanghai Bell
84. R3-214385 (TP to TS 38.401 BL CR) Support of PTP and PTM switch Huawei, CBN, China Unicom, China Telecom
85. R3-214416 (TP for 38.300) Mobility with non-MBS supporting NG-RAN nodes Nokia, Nokia Shanghai Bell
86. R3-214430 (TP for 38.413) Stage 3 for MBS Group Paging Nokia, Nokia Shanghai Bell, Huawei
87. R3-214447 CB: # MBS8\_Others - Summary of email discussion ZTE - moderator
88. R3-214462 LS on Full Configuration in handover to MBS non-supporting gNB Lenovo, Motorola Mobility
89. R3-214509 Introduction of NR MBS Nokia, Nokia Shanghai Bell
90. R3-214510 Introduction of NR MBS Huawei, CMCC
91. R3-214511 MBS BL CR for TS38.410 ZTE
92. R3-214512 BL CR for NR MBS for 38.413 Qualcomm
93. R3-214513 Introduction of NR Multicast and Broadcast Services Ericsson
94. R3-214518 BL CR to TS38.420 CMCC

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28.01.2021 minor adaptations for RAN #91e

09.11.2020 minor adaptations for RAN #90e

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20.04.2020 minor adaptations for RAN #88e

18.02.2020 minor adaptations for RAN #87e

14.11.2019 minor adaptations for RAN #86

18.08.2019 minor adaptations for RAN #85

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v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

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v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

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