**3GPP TSG RAN Meeting #102 RP-23xxxx**

**Edinburgh, Scotland, December 11-15, 2023 (revision of RP-231829‎)**

**Source: CATT, CBN**

**Title: Revised WID for Enhancements of NR Multicast and Broadcast Services**

**Document for: Approval**

**Agenda Item: 9.3.2.8**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: Enhancements of NR Multicast and Broadcast Services

## Acronym: NR\_MBS\_enh-Core

## Unique identifier: 940099

NOTE: For new WIs/SIs leave the Unique identifier empty and make a proposal for an Acronym.

 For a revised WI/SI: Take Unique identifier and acronym as shown in 3GPP workplan.

 If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI.

 Please tick (X) the applicable box(es) in the table below:

 Either:

|  |  |
| --- | --- |
| **This WID includes a Core part** | **X** |
| **This WID includes a Performance part** |  |

 or:

|  |  |
| --- | --- |
| **This WID includes a Testing part** |  |
| **and it addresses the following 3GPP work area:** | **Radio Access** |  |
| **Core Network** |  |
| **Services** |  |

## 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  | X | X | X |  |
| **No** | X |  |  |  |  |
| **Don't know** |  |  |  |  | X |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a … *{Tick one box. "***Feature** */* **Building Block** */ Work Task" form a hierarchical structure. E.g. no Building Block can be proposed without a corresponding parent Feature. The full structure of all existing Work Items is shown in the 3GPP Work Plan in* *ftp://ftp.3gpp.org/Information/WORK\_PLAN* *}*

|  |  |
| --- | --- |
| X | Feature |
|  | Building Block |
|  | *Work Task* |
|  | Study Item |

NOTE: Normally, Core/Perf./Testing parts in RAN WIDs are Building Blocks. Only if they are under an SA or CT umbrella, we define them as work tasks. If you are in doubt, please contact MCC.

### 2.2 Parent Work Item

*{Not applicable for* **Feature** *nor for a* **Study Item***}*

*{For a* **Building Block***: list here the parent* **Feature** *}*

*{For a* Work Task*: list here the parent* **Building Block** *}*

|  |
| --- |
| Parent Work Items  |
| Unique ID | Title |
|  |  |

NOTE: RAN agreed some time ago, that it describes the feature WI + Core/Perf. part WI or Testing part WI in one WID. Therefore the table above should just include the feature WI Unique ID and title.

### 2.3 Other related Work Items and dependencies

*{List here other Work Items which relate to the proposed one, such as preceding SI or a preceding WI (e.g. if further enhancing a feature).}*

|  |
| --- |
| Other related Work Items (if any) |
| Unique ID | Title | Nature of relationship |
| 860048 | Work Item on NR Multicast and Broadcast Services | Rel-17 NR Multicast and Broadcast Services Support WI |
| [900038](https://www.3gpp.org/DynaReport/WiVsSpec--900038.htm%22%20%5Ct%20%22_blank) | Architectural enhancements for 5G multicast-broadcast services | Rel-17 SA2 WI on 5G multicast-broadcast services. |
| 850040 | Broadcast / Multicast requirements supporting Mission Critical Services in 5G | Rel-17 SA6 WI on 5G MBS support of MCS |
|  |  |  |

NOTE: Also related or dependent WIs/SIs in other TSGs should be indicated.

## 3 Justification

To enable resource-efficient delivery of multicast/broadcast services, 3GPP has developed NR broadcast/multicast in Rel-17 according to the WID in RP-201038, aiming to enable general MBS services over 5GS. The use cases identified that could benefit from this feature include public safety and mission critical, V2X applications, IPTV, live video, software delivery over wireless and IoT applications, etc. Two delivery modes have been agreed for Rel-17 MBS with delivery mode 1 (only for multicast) capable of addressing higher QoS services and delivery mode 2 (only for broadcast) focusing on lower QoS services. Given that Rel-17 MBS already provide the basic function to support MBS services, the general main goal for Rel-18 should be to enable better deployment of MBS, such as improvement of resource efficiency and capacity based on Rel-17 MBS.

In Rel-17, RAN only specifies multicast for UEs in RRC\_CONNECTED state, which may not fully fulfil the requirements of, e.g., Mission Critical Services, especially for cells with a large number of UEs according to TR 23.774. Also, to always keep UEs in RRC\_CONNECTED state is not power efficient. It is ‎therefore important to support multicast for UEs in RRC\_INACTIVE.

The Rel-17 NR MBS broadcast solution allows that the UE receives broadcast service in a downlink only manner i.e. performing broadcast reception without a need to access the network beforehand. However, in the typical use case for broadcast, the UE may be required to simultaneously receive broadcast service and unicast service from the network(s) of same or another operator, and some UEs may share the hardware resources between broadcast and unicast. Therefore, the unicast connection might be impacted by the broadcast reception for this kind of UEs. The optimization for such case is not specifically addressed in Rel-17, and should focus on the case of unicast reception in RRC\_CONNECTED and broadcast reception from the same or different operators, including emergency and public safety broadcast.

Network sharing is a common practice to reduce network CAPEX. With RAN sharing deployment, if the same Broadcast service is provided by two (or more) operators separately, this service would be recognized as separate TMGIs resulting in duplicated PTM radio resources consumption in the same cell for transmission of the same content. This justifies resource efficiency improvement in the RAN sharing scenario.

Note that public safety services benefit from the Rel-17 NR MBS functions, as well as from Rel-18 enhancements that follow the above ‎justifications. ‎

## 4 Objective

### 4.1 Objective of SI or Core part WI or Testing part WI

This Work Item is to further enhance the NR Multicast/Broadcast functions based on Rel-17 MBS. The objectives for Rel-18 include:

* Specify support of multicast reception by UEs in RRC\_INACTIVE state [RAN2, RAN3, RAN1(acc. to LS R2-2304330)]
	+ PTM configuration for UEs receiving multicast in RRC\_INACTIVE state [RAN2, RAN3, RAN1(acc. to LS R2-2304330)]
	+ Mobility and state transition for UEs receiving multicast in RRC\_INACTIVE. (Seamless/lossless mobility is not required) [RAN2, RAN3]
* Specify Uu signalling enhancements to allow a UE to use shared processing for MBS broadcast and unicast reception, i.e., ‎including UE capability and related assistance information reporting regarding simultaneous unicast reception in RRC\_CONNECTED and MBS broadcast reception from the same or different operators [RAN2]
* Specify enhancements to improve the resource efficiency for MBS broadcast reception in RAN sharing scenarios [RAN3]

Note: collaboration with SA2 is expected in due course for the above objectives.

### 4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

### 4.3 RAN time budget request (not applicable to RAN5 WIs/SIs)

NOTE: For all new RAN related WIs/SIs which are not led by RAN WG5 the WI/SI rapporteur has to fill out the attached Excel table to request time budgets for corresponding RAN WG meetings.
The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI.
One time unit (TU) corresponds to ~ 2 hours in the meeting.
If no TU is needed, then leave the field empty otherwise enter a number >0 in the field.

 For revisions of already approved WI/SI descriptions: Please remove the Excel table from the WID/SID's zip file. The time budgets are already recorded. If you want to modify them, then this has to be done via the status report and not via a revised WID/SID.

 If this WID is covering Core and Performance part, then please fill out one line for each part in the attached Excel table.

**additional comments to the time budget request in the attached Excel table:**

## 5 Expected Output and Time scale

|  |
| --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Remarks |
| *{Possible values:**"TS" or* *"Internal TR" or* *"External TR". See Note 1}* | *{E.g.* *"22.XXX" or actual number if known}* | *{Title of the specification (as per TR 21.801 §6.1.1), to be aligned as much as possible with the WI/SI title}*  | *{E.g.* *"TSG#87"}* | *{E.g.* *"TSG#89"}* | *{e.g.: rapporteur:**<FamilyName>, <GivenName>, <Company>, <email address>}* |

*{Note 1: Only TSs may contain normative provisions. Study Items shall create or impact only TRs.
"Internal TR" is intended for 3GPP internal use only whereas "External TR" may be transposed by OPs.}*

NOTE: If this is a RAN WI including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Remarks for each spec.
By default a new specs can only be new for one of both parts.

|  |
| --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 38.300 | NR;NR and NG-RAN Overall Description | RAN#102 | Core part |
| 38.331 | NR; Radio Resource Control (RRC) Protocol Specification | RAN#102 | Core part |
| 38.304 | NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state | RAN#102 | Core part |
| 38.321 | NR; Medium Access Control (MAC) protocol specification | RAN#102 | Core Part |
| 38.306 | NR; User Equipment (UE) radio access capabilities | RAN#102 | Core Part |
| 38.323 | NR; Packet Data Convergence Protocol (PDCP) specification | RAN#102 | Core Part |
| 38.423 | NG-RAN; Xn Application Protocol (XnAP) | RAN#102 | Core part |
| 38.413 | NG-RAN; NG Application Protocol (NGAP) | RAN#102 | Core part |
| 38.473 | NG-RAN; F1 Application Protocol (F1AP) | RAN#102 | Core part |
| 38.401 | NG-RAN; Architecture description | RAN#102 | Core part |
| 37.483 | E1 Application Protocol (E1AP) | RAN#102 | Core part |
| 38.470 | NG-RAN; F1 General aspects and principles | RAN#102 | Core part |
| 38.410 | NG-RAN; NG General aspects and principles | RAN#102 | Core part |
| 38.202 | NR; Services provided by the physical layer | RAN#102 | Core part |
| 38.211 | NR; Physical channels and modulation | RAN#102 | Core part |
| 38.212 | NR; Multiplexing and channel coding | RAN#102 | Core part |
| 38.213 | NR; Physical layer procedures for control | RAN#102 | Core part |
| 38.214 | NR; Physical layer procedures for data | RAN#102 | Core part |

NOTE: If this is a RAN WI including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Remarks for each spec.
If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

## 6 Work item Rapporteur(s)

*Rui Zhou, CATT, zhourui@catt.cn*

## 7 Work item leadership

*Primary: RAN2*

*Secondary: RAN3*

## 8 Aspects that involve other WGs

*Coordination with SA2 is needed*

NOTE: For RAN WIs: Section 8 applies only to WGs outside of TSG RAN because RAN WG aspects have to be covered in section 4.

## 9 Supporting Individual Members

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| --- |
| Supporting IM name |
| CATT |
| CBN |
| CMCC |
| CAICT |
| China Unicom |
| China Telecom |
| Huawei |
| HiSilicon |
| Lenovo |
| Motorola Mobility |
| Samsung |
| Intel |
| Xiaomi |
| vivo |
| H3C |
| APT |
| FGI |
| SHARP Corporation |
| Spreadtrum Communications |
| Continental Automotive |
| HONOR |
| NEC |
| Kyocera |
| Nokia |
| Nokia Shanghai Bell |
| TD Tech |
| Chengdu TD Tech |
| TCL |
| ZTE Corporation |
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| Verizon |
| AT&T |
| OPPO |
| Ericsson |
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