3GPP TSG-RAN WG3 #112-e R3-212704

Online, 17th - 27th May 2021

Agenda Item: 22.2.2

Source: Ericsson (moderator)

Title: CB: # 100\_MBS\_NGsessMgmt - Summary of email discussion

Document for: Approval

# Introduction

**CB: # 100\_MBS\_NGsessMgmt**

**- (ZTE)**

use “MBS Session Resource Setup/Release/Update” to name the NGAP procedures for broadcast session management .

introduce a new type of logical NG-connection (i.e., MBS-session-associated signalling) which is associated to one MBS session (e.g., broadcast session).

MBS session resource setup request message from 5GC to NG-RAN includes MBS session resource setup Request Transfer, which includes TNL information (i.e., UPF endpoint of the NG-U transport bearer), and MBS Session Type (i.e., IPv4/IPv6/ethernet).

up to RAN to decide whether IP multicast or unicast is used in 5GC shared delivery method. When 5GC requests to use IP multicast distribution (i.e. provides RAN the <IP multicast address, source IP address, source TEID>), RAN is able to accept or reject the request. If RAN rejects IP multicast, RAN is able to decide to use shared PTP GTP-U Tunnel and response with the DL FTEID for user plane.

The 5GC individual MBS traffic delivery method for the MBS session(s) associated with one PDU session uses only one N3 tunnel, no matter the PDU Session associates to one or more MBS Session(s).

wait for RAN2’s further input before discussing the details of NGAP message for group paging.

**- (Nok)**

When the MB Session Resource setup request message is received the NG-RAN node creates the context for the indicated MBS session if not yet existing and replies success if at least successful in one cell. If context is existing, the setup request message is not checked and analyzed, still replied with success.

When the first MB Session Resource setup request message is received, the NG-RAN node triggers the MB User Plane Setup procedure to setup the N3 shared delivery, using same procedure as for multicast.

When the MB Session Resource release request message is received, the NG-RAN node removes the context for the indicated MBS session if existing, replies with success to AMF and triggers the MB User Plane release procedure to release the N3 shared delivery, same as used for multicast. If the context is not existing for the indicated MBS session it simply replies with success.

When the MB Session Resource update request message is received, the NG-RAN node updates the area over which the delivery of broadcast data is done according to the new indicated broadcast area. It replies with success if the broadcast could at least be started/stopped in one cell.

capture in stage 2:

- the UE MBS context is setup using PDU Session Modify procedure

- 5GC requests the NG-RAN node to setup MBS context including the MBS Session ID, MB-SMF ID, multicast QoS flow information, mapping between multicast and unicast QoS flow information.

- the NG-RAN node triggers a non-UE associated procedure to setup the user plane between NG-RAN and MB-UPF including the MB-SMF ID and DL Transport layer address.

- NG-RAN node may setup radio resources when receiving PDU session Modify Request. The NG-RAN node signals its capability through the accepted QFI in the PDU session modify response.

**- (QC)**

MBS multicast mode uses similar state model in RAN as PDU Session Resource in unicast: MBS Session Resource Setup/Release establishes/Releases both MBS Session Context and UP.

Add UE MBS context information into N2 container: PDU Session Resource Modification Transfer.

Support MBS Session Resource pre-establishment using non-UE specific signaling for delay sensitive service.

Reuse NR MBS broadcast mode session management signaling (MBS Session Resource Setup) for multicast mode NR MBS Session Resource pre-establishment.

**- (CATT,CBN,HW)**

discuss and agree whether MBS context should always be established or not during Multicast session establishment procedure, i.e. whether there is MBS context in NG-RAN node if the MBS session is in inactive state

Based on conclusion from above proposal, decide on:

- whether multicast session activation/deactivation would involve control plane signaling between NG-RAN node and 5GC or not for connected UE

- whether NG-RAN resources should be released during Multicast Session Release procedure.

**- (SS)**

Capture the agreement of MBS Session Start, MBS Session Stop procedure for broadcast serving in Ng interface

agree MBS Session Update procedure for broadcast serving in Ng interface.

Capture the agreement of PDU Session Setup, PDU Session Modify procedure for multicast service in Ng interface

NG-RAN should not select whether multicast or unicast transport is used on NG-U/N3.

NG-RAN includes the indicator of whether supporting MBS or not in PDU Session Setup/Modify Response.

**- (E///)**

(see also proposals from 2092)

Define 2 Sets of NGAP Elementary Procedures:

- 5GC triggered procedures:

-- MBS Session Resource Activation

-- MBS Session Resource Modification

-- MBS Session Resource Deactivation

- NG-RAN triggered:

-- MBS Session Resource Establishment

-- MBS Session Resource Release

with possible, but not necessarily stage-3 specified interaction between the NG-RAN and 5GC triggered procedures, where applicable.

Define an MBS Session Resource as follows: The term is used on NG-RAN interfaces. It denotes NG-RAN interface and radio resources provided to support an MBS Session. On NG it is associated to a shared NG-U tunnel established to provide transport means for 5GC shared MBS traffic delivery towards a gNB.

Irrespective from the final method chosen in SA2, a gNB may receive Session Activation signaling for an MBS Session from more than one AMF resulting in the setup of a single instance of MBS Session Resources within the gNB.

Extend proposal above to cover location dependent MBS Services: the term “MBS Session Resource” denotes NG-RAN interface and radio resources provided to support an MBS Session and is associated to one or several shared NG-U tunnels established to provide transport means for 5GC shared MBS traffic delivery towards a gNB.

Define an NG-RAN node triggered MBS Session Resource modification procedure to allow extension or reduction of the scope of an MBS Session consisting of several local areas.

Provide sufficient information within MBS Session Activation signalling to allow the gNBs to deal with UE mobility and UEs joining the session w/o the need to update location relation information during the ongoing active session. The gNB is expected to receive location information that is reduced to its serving area to some extent.

Specify means to allow the gNB releasing not only radio resources but all MBS Session Resources at MBS Session Deactivation. Details to be further looked at.

Allow to gNB to report whether MBS Session Resources were not able to be provided in the whole or parts of the MBS service area.

NGAP MBS Session Resource signalling contains an NG-C part and an MB-SM container specific for the purpose of the MBS Session management procedure/message. The NG-C part contains the MBS session specific NGAP IDs (AMF/RAN MBS NGAP ID). The content of the MB-SM container relates to a specific MBS Session Resource instance only.

Re-use unicast QoS Flow QoS Parameters and QoS flow structure with the understanding, that applicability of existing parameters for NR MBS will be specified by SA2 in stage 2.

agree on the final details for NGAP MBS Session Resource procedures:

- 5GC triggered:

-- MBS Session Activation, class 1 to allow a negative response, MB-SM containing area and area IDs and QoS flow parameters

-- MBS Session Deactivation, class 2 request to remove radio resources for MBS Session

-- MBS Session Modification, class 1 to allow a negative response, MB-SM as for activation

- NG-RAN triggered:

-- MBS Session Establishment, class 1 basically setting up shared NG-U tunnels

-- MBS Session Release, class 1 removing NG-U tunnel and all MBS Session context data

-- MBS Session Modification Required, class 1 for location dependent MBS Services, adding and releasing NG-U tunnels

Typically, the following interactions is foreseen:

- MBS Session Activation interacts with the MBS Session Establishment

For location dependent services:

- MBS Session Modification Required may interact with MBS Session Modification or be triggered by UE mobility or joining activity

At Session Deactivation:

- The MBS Session Release procedure may be triggered.

**- (Len,Moto)**

PDU Session Resource Setup and Modify procedures are used for both multicast session join and establishment.

When the gNB receives an MBS Session ID but MBS session resource does not exist for that MBS Session ID, the gNB uses the included MBS Session QoS information to allocate resources to serve this multicast session. Otherwise the gNB uses the existing allocated resource for the MBS Session.

MBS Session Context, i.e. MBS Session ID, multicast QoS Information, the mapping between unicast QoS flow and multicast QoS flow, should be included in the SMF container PDU Session Resource Setup Request Transfer and PDU Session Resource Modify Request Transfer.

Support group paging over NG interface for multicast session activation.

The group paging identity (i.e. MBS Session ID v.s. S-TMSI of multicast session) needs further input from SA2.

Local MBS service area information, i.e. cell ID list or TAI list, should be included in the NG group paging message, if any.

The PDU Session Resource Modify and PDU Session Resource Release procedures are used for multicast session leave.

The gNB may release the multicast session resource when there is no UE interested in the MBS session.

Both multicast transport and non-multicast transport are supported. In cast of non-multicast transport, gNB allocates TNL info of the GTP-U tunnel. In case of multicast transport is used, 5GC provides a common GTP-U TEID and IP address to gNB.

**- (LG)**

MBS session ID should be introduced in the NGAP PAGING message so that the NG-RAN supporting MBS pages the UEs which are not in RRC\_CONECTTED state, and it should be also included in the F1AP PAGING message.

**- (CMCC,HW)**

SMF forwards MBS context and the received QoS information to AMF via PDU session modification command.

A Class 1 multicast distribution procedure should be introduced for the user plane establishment between NG-RAN and UPF/MB-UPF.

RAN could select these two choices if shared MBS traffic delivery method is decided by 5GC.

There will no MBS session established in 5GC individual MBS traffic delivery and it cannot be regard as correspondence with mapping between PDU session and MBS session.

Mapping between PDU session and MBS session corresponds for 5GC shared MBS traffic delivery to one or several (shared) NG-U/N3 tunnels.

New NGAP will be added for multicast session activation/deactivation between CN and RAN.

**- Chair:** huge task. If feasible and if agreeable, suggest splitting work among companies for 1) procedure descriptions (basis for NGAP TP), 2) transport (multicast/unicast, NG-U tunnels, etc. – st2 TP(s)? But of course related to st3), 3) other possible details

(E/// - moderator)

Summary of offline disc R3-212704

# For the Chairman’s Notes (to be updated)

Propose the following:

R3-21xxxa, R3-20xxxc merged

R3-21xxxc rev [in xxxg] – agreed

R3-21xxxd rev [in xxxh] – agreed

R3-21xxxe rev [in xxxi] – agreed

R3-21xxxf rev [in xxxj] – endorsed

Propose to capture the following:

**Agreement text…**

**Agreement text…**

**WA: carefully crafted text…**

Issue 1: no consensus

**Issue 2: issue is acknowledged; need to further check the impact on xxx. May be possible to address with a pure st2 change. To be continued…**

# Discussion

## MBS Session Resource management

### Scope and Definition of MBS Session Resources

We had already agreements on the analogy between PDU Session and MBS Session from NG-RAN point of view, as quoted below:

We Define MBS session resource in analogy with PDU session resource, e.g. including radio part, CP part, NG-UP part, MBS context in RAN

MBS session resource establishment is requested by 5GC (similarly to the PDU session establishment for unicast)

RAN may request MBS session resource UP establishment, e.g. in handover (FFS). The signaling procedure (e.g. nested in handover signaling or new procedure, whether a single procedure is used or not, …) is FFS.

MBS Session Resources: the term to denote NG-RAN resources for control and delivery of MBS user data, to be used on NG, Xn, F1 and E1.

[4] and [18] propose to use these agreements, extend them with the latest findings in SA2 and formulate the following stage-2 definition proposed for the BL CR for 38.401:

**MBS Session Resource**: The term is used on NG-RAN interfaces. It denotes NG-RAN interface and radio resources provided to support an MBS Session and is associated to one or several shared NG-U tunnels established to provide transport means for 5GC shared MBS traffic delivery towards a gNB.

Note: The plural for *NG-U tunnel* in the statement above intends to cover location dependent MBS Sessions.

Further, [4] and [18] propose to clarify the scope of an MBS Session Resource:

From an NG-RAN point of view, a per MBS Session association is setup and maintained between an MBS Session Resource instance in the NG-RAN node and a corresponding one within the 5GC.

Please provide your view in the table below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Not sure whether the following part is needed or not since the NG-RAN interface already include both control plane and user plane.  *and is associated to one or several shared NG-U tunnels established to provide transport means for 5GC shared MBS traffic delivery towards a gNB*. |
| Nokia | 1/ NOK. We simply use MBS context.  2/ NOK for MBS Session association. There is no need for MBS association if there is an MBS session ID in the message. It is unclear what MBS Session Resource Instance refer to. |
| Huawei | 1, not needed, as mentioned by Nokia that MBS context will be used.  2, not needed, why we need to have a MBS Session association? For the MBS related non UE associated procedures, MBS Session id will be used as the link. |
| Ericsson | I can see that we are in agreement that an association is needed, but in disagreement which information the association constitutes.  We agreed that the term for the entity that comprises CP and UP resources in RAN to support an MBS Session is called “MBS Session Resource”. I hope this is synonymous for what you call “MBS Context”.  An MBS Session Resource instance is the manifestation of the CP and UP resources in RAN to support a *particular* MBS Session. In analogy to an instance of a PDU Session Resource for “unicast services”. |
| Qualcomm | 1, Agree to use “MBS Session Resource” as name of MBS Session Context in RAN.  2, Not need to introduce “MBS Session Association” and “MBS Session Resource Instance”. |
| Samsung | 1. “MBS Session Resource” is fine. 2. Seems no need to define an instance. |
| Lenovo, Motorola Mobility | 1. e prefer to only have the first half of the sentence as commented by CATT. 2. To be honest, we are in difficult to understand the MBS session association and MBS session resource instance. Where are the definitions from? |
| CMCC | 1. We are fine with MBS session resource 2. Instance is not needed |
| ZTE | Agree |

### NG-RAN implications on the MBS Session Resource state model

SA2 has introduced a state-model for MBS Sessions, which needs to be translated for NG-RAN, discussions in [12] and [13] hint to the fact, that we should be clear on what the state model means.

The moderator would like to suggest agreeing at least on the following:

- NG-RAN does not keep radio resources allocated during inactive MBS Sessions

- NG-RAN performs admission control at MBS Session Activation for NG-RAN resources and when a UE “enters” an cell/gNB during an active session as “first” UE that has joined the session.

Please provide your view in the table below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | OK |
| Nokia | NOK for 1/ it maintains in cells in which there are at least one inactive or connected UEs.  NOK for 2/ admission control only takes place only in cells where all UEs are idle. |
| Huawei | NOK. We think it is up to NG-RAN implementation, e.g. keep MRB configuration during inactive MBS session. |
| Ericsson | I gather we are in major disagreement here.  Keeping MBS session resources in an admitted state, i.e. blocking requests of other MBS Session Resources from being admitted, although the MBS Session is inactive, is not acceptable for Ericsson. |
| Qualcomm | Not sure what “radio resources” is. Traffic is usually scheduled dynamically and resource is allocated dynamically in DL transmission. Do you mean MRB or low layer configurations?  Admission control should be performed during MRB setup, which could be triggered by Session Activation. |
| Samsung | For 1), It is not good to keep the MRB and NG-U in NG-RAN even the deactivation period is long. Prefer NG-RAN can release the MRB and NG-U during the deactivation period for resource efficiency.  For 2), it is fine. |
| Lenovo, Motorola Mobility | We think NG-RAN should release the radio resource but NG-RAN can keep the context and configuration of an inactive MBS Session |
| CMCC | 1. it seems so from efficiency point of view 2. Clarify the understanding that here admission control means, is that when the CN wants to activation the MBS session, NG-RAN will check whether the MRB resources can be setup? |
| ZTE | Disagree on 1.  Up to NG-RAN how to deal with the RAN resources for an inactive Multicast session. |

### MBS Session Resource Management procedures

There seem to be a common/majority view on having two sets of MBS Session Resource Management procedures, which is in line with the agreements quoted in §3.2.1 above:

- 5GC triggered MBS Session Resource Management NGAP protocol functions

- NG-RAN triggered MBS Session Resource Management NGAP protocol functions

As a starting point of discussions, the moderator proposes to adopt (in this first iteration step) a work-split between 5GC and NG-RAN triggered MBS Session Resource Management procedure:

- the 5GC triggered functions request the setup/modification/release of the RAN part of the MBS Session Resources so that NG-RAN can perform admission control and execute establishment of radio resources ([7], [18]).

- the NG-RAN triggered functions are limited to request the setup/release of NG-U resources but does not deal with control of other properties of the MBS Session Resource ([16], [18], [22]).

NOTE: There is an interdependency of this question with the section “whether shared NG-U transport exists during an inactive MBS Session”. The proposal in [12] would only work if there wouldn’t be the option keep shared NG-U resources during inactive sessions. See also [13].

Please provide your view in the table below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | For the bullet *the NG-RAN triggered functions are limited to request the setup/release of NG-U resources but does not deal with control of other properties of the MBS Session Resource ([16], [18], [22]),*we do not think NG-RAN triggered function are limited to request setup/release of NG-U resource.  Take handover procedure as an example, although it is possible the target node drive the MBS context from the source node during handover preparation procedure, it is not precluded that MBS configuration is modified after handover request is sent from source to target. In this case, to guarantee that the MBS configuration is unified among all involved gNBs, the 5GC should also include the latest MBS configuration when setup NG-U tunnel requested by the target NG-RAN node.  So, we think NG-RAN triggered functions could request the setup of not only NG-U resource but also the MBS configuration. |
| Nokia | Question unclear if multicast or broadcast. If for multicast:  1/ OK if this means PDU session setup/modify/release.  2/ OK |
| Huawei | OK  For multicast:  1/ means PDU session setup/modify/release  2/ means MBS distribution setup/release  For broadcast:  1/ means MBS session start/modify/stop |
| LG | For multicast, 1/ is fine if this means PDU session setup/modify/release. |
| Ericsson | This item is talking about multicast, thousand times sorry, please, that I was not explicit on that. What a donkey I am.  We prefer to not rely on PDU Session setup/modify/release, as we also request to allow features which are mainly/only necessary for inter-working with non supporting RAN nodes, should be not applied for homogenous deployments. And this includes associated QoS flow information the associated PDU Session information.  Further, it is much cleaner, conceptually, etc, to perform signaling that concerns admission control and the subsequent maintenance of those admitted resources like modification or release, between the same entities.  Further, PDU Session signaling would only trigger admission control in case of active MBS Sessions, so this is not a general solution.  Therefore, the NGAP protocol functions support communication between the (supporting) NG-RAN node and the MB-SMF, by AMF-transparent means, in analogy to SM related communication for PDU Session Resources between the NG-RAN node and the SMF. |
| Qualcomm | For 1 (5GC initiated), we are fine with either UE associated signaling as proposed by Nokia/Huawei/LG and non-UE associated signaling as proposed by Ericsson. Non-UE associated signaling allows pre-establishment of MBS Session Resource for delay sensitive service, e.g. GCS (group call service). UE associated signaling is more aligned with current SA2 specs.  We can also discuss whether to support both.  For 2 (NG-RAN initiated), our preference [12] was to analogy with PDU Session Resource and then have joint CP/UP setup/release. If so, the RAN initiated procedure is not only for UP setup but also for the MBS Session Resource setup.  We are also fine if majority prefer to limit the RAN initiated procedure for UP only. |
| Samsung | For 1, we have same view as QC.  For 2, we are fine to limit the RAN initiated procedure for UP only. |
| Lenovo, Motorola Mobility | Same view with Huawei and Nokia.  1/ OK if this means PDU session setup/modify/release.  2/ OK. |
| CMCC | For 1, PDU session setup/modify/release  For 2, OK for UP |
| ZTE | 5GC needs to be able to setup/modify/release the MBS session resource for both broadcast and multicast.  Too much attention is paid to Non-supporting node and inter-working with which.  We support Ericsson that "homogeneous deployments" shall be our focus. |

The stage 3 realization of these NGAP functions are as follows:

- 5GC triggered functions

- Procedures for Session Activation and De/activation are realized as class 1 procedures.

- NG-RAN triggered functions

- for setup and release of NG-U transport are realized as class 1

Please provide your view in the table below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | It is OK for 5GC triggered function. However, for NG-RAN triggered function, as we commented above, it may also trigger the MBS configuration transfer from 5GC to NG-RAN node. |
| Nokia | Again unclear. Assuming question is for multicast  Activation/Deactivation: NOK  Setup/release NG-U class 1. |
| Huawei | Ok for multicast |
| Ericsson | Guess we still have a long road ahead. |
| Qualcomm | Agree. But, this also depends on the conclusion of last question. |
| Samsung | It is OK. |
| Lenovo, Motorola Mobility | OK. |
| CMCC | Agree |
| ZTE | Stage 3 details can be FFS after stage 2. |

There are proposals to introduce a 5GC triggered class 1 procedure for MBS Session modification.

Please provide your view in the table below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Yes. |
| Nokia | OK for broadcast only. |
| Huawei | Yes.  For broadcast, there could be a broadcast session modification class1 procedure.  For multicast, the PDU Session modify procedure will be used, and the need to have a class 1 multicast session modification to update e.g. MBS QoS profile is up to SA2 discussion. |
| LG | OK for broadcast only. |
| Ericsson | For broadcast and multicast. |
| Qualcomm | OK for both broadcast and multicast. |
| Samsung | OK for both broadcast and multicast |
| Lenovo, Motorola Mobility | For multicast, PDU session modify procedure is preferred. |
| CMCC | OK for broadcast |
| ZTE | Agree nfor both multicast and broadcast. |

There are proposals to introduce a 5GC triggered class 1 procedure for release of the NG-U transport ([16]).

Please provide your view in the table below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | It depends on whether the NG-U transport and other MBS context should be released together or not. |
| Nokia | NOK. This is not aligned with SA2 TS 23.247. |
| Huawei | Ok, note that there is also ongoing discussion in SA2 on this aspect. |
| Ericsson | It should be very well agreeable to support functions allowing RAN to request release of resources. |
| Qualcomm | Agree |
| Samsung | Agree |
| Lenovo, Motorola Mobility | OK. |
| ZTE | Agree. It is reasonable that 5GC may want to release a MBS session according to application's request. 5GC triggered class 1 procedure is efficient to achieve this goal. |

### Group Notification in supporting gNBs

In [3] RAN2 confirms the feasibility of group paging for multicast in a gNB using the MBS session ID. RAN2 also agreed to use the same group notification identity for UEs RRC\_IDLE and RRC\_INACTIVE states.

There are several approaches for that NGAP function:

1. separate messages on NG-C: Group Paging as class 2 procedure (either new message or enhanced legacy Paging) and the actual Session Activation message. ([7] but suggest to rather wait for RAN2/SA2, [16], [21])

2. Provide Group Paging information with the same message that activated the MBS Session [18].

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | No strong opinion. But we also prefer to wait for further progress in RAN2/SA2 |
| Nokia | Option 1. |
| Huawei | Option 1.  Prefer to have separate procedure for Group Paging (Class 2) and MBS Session Activation (Class 1).  As the MBS Session Activation will be send to the RAN nodes which have connected mode UEs joined the MBS Session, and Group Paging will be send to the MBS supporting RAN nodes which are included by the TAIs of the UEs joined the MBS Session, these two things may be overlapped and maybe not overlapped. The RAN node needs to understand whether only group paging need to be performed, whether only Session activation will be triggered, or both. |
| LG | Option 1. |
| Ericsson | **Ok, then lets go for a Group Paging Class 2 procedure** |
| Qualcomm | Option 1 |
| Samsung | Prefer to wait further conclusion from SA2/RAN2. Also, it is related to delivery area of MBS Session Activation. |
| Lenovo, Motorola Mobility | No strong view. We are fine to go with option 1. |
| CMCC | No strong view, may follow the majority group paging class 2 |
| ZTE | FFS pending to RAN2/SA2's progress. |

Group Notification information within RAN needs a (compiled) list of paging targets (cells, Tracking areas) and paging restrictions in case of local MBS service areas ([20]). Paging optimizations, paging repetitions may be applied by the AMF dependent on paging policies and assistance information available at the AMF. For RAN Paging, equivalent mechanisms and consideration apply, legacy RAN paging would need to be enhanced.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | OK. |
| Huawei | Seems ok, but what is the “paging restrictions in case of local MBS service areas”? should it be covered by the paging targets(cells, Tracking areas)?  On the other hand, maybe a (UE id + DRX) list will be included in the Group Paging, subject to RAN2 design. |
| Ericsson | Ok, so we assume that **The new group paging message contains: Group Paging ID and paging area (cell/TAs). Paging optimizations, paging repetitions may be applied by the AMF dependent on paging policies and assistance information available at the AMF. For RAN Paging, equivalent mechanisms and consideration apply, legacy RAN paging would need to be enhanced** |
| Qualcomm | Slightly prefer to enhance current paging message instead of defining a new class 2 message. |
| Samsung | AMF doesn’t know the paging area currently. Prefer to wait for SA2 further conclusion. |
| Lenovo, Motorola Mobility | OK with the principle. |
| CMCC | OK |
| ZTE | FFS pending to RAN2/SA2's progress. |

### Signaling association of an MBS Session Resource instance on NG-C

Different NGAP MBS Session Resource procedures may relate to the same MBS Session Resource instance on an NG interface instance, which requires a signaling association to be provided in respective NGAP MBS procedures.

There are two approaches to denote an MBS Session Resource instance on NG-C:

1. similar to UE-associated signaling, with an 5GC and an NG-RAN allocated identifier, unique in the gNB and the AMF (set), associated to an MBS Session Resources instance. ([7], [18])

2. other means (e.g. [11]) by exchanging node identifiers in addition to the MBS Session ID.

NOTE: the difference seems to be the scope of the “signaling association”, should it be constrained to the NG-C (the scope of NGAP) or different.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | NOK. There is no such thing as an NG-C signaling association since AMF has no MBS context in our view. Option 2 seems the closest. |
| Huawei | Share the view with Nokia. |
| Ericsson | We disagree, but this is not surprising. I guess we repeat the discussion from above, but fine. |
| Qualcomm | This depends on question in 3.1.3. If non-UE associated signaling is used, this is necessary. If UE associated signaling is used, this is not needed. |
| Samsung | Depends on previous question. |
| Lenovo, Motorola Mobility | Same view with Nokia. |
| CMCC | Share the view with Nokia. |
| ZTE | We prefer Option 1. Similar with UE-associated signaling, MBS session resource instance is established/released more dynamically compared with NG interface instance. |

### Handling of MBS Session Resource Setup/Activation received from several AMFs

The following aspects have to be regarded:

For an active MBS Session, one MBS Session Resource is established comprising a signaling association between the gNB and an AMF. MBS Session Resource Setup/Activation may be received via different AMFs connected to the same gNB.

First proposed possible principle: There shall be at most one signaling connection established between the NG-RAN node and the AMF.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Maybe the first principle should be updated as below which implies that for one MBS session, only one signaling connections is established between NG-RAN node and all AMFs:  *There shall be at most one signaling connection established between the NG-RAN node and the AMFs.* |
| Nokia | NOK. It would be nice to start differentiating broadcast and multicast. We make no progress due to this confusion between Setup and Activation! |
| Huawei | For multicast session activation, for one MBS Session, the MB-SMF will only transmit multicast session activation towards the NG-RAN node via a single AMF. |
| Ericsson | Ok, so the role of AMF needs further clarification / discussion. No progress on that topic. |
| Qualcomm | For this, we should wait for SA2 conclusion. |
| Samsung | We should wait for SA2 conclusion. |
| Lenovo, Motorola Mobility | Need further checking. |
| ZTE | Agree. Also, the role of AMF needs further clarification / discussion. |
|  |  |

Second proposed possible principle: All other (concurrently) received MBS Session Resource setup/activation requests should be negatively responded clearly indicating that the request is positively responded via another AMF.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | OK |
| Nokia | NOK. It would be nice to start differentiating broadcast and multicast. We make no progress again due to this confusion between Setup and Activation! |
| Huawei | For multicast it will not happen. |
| Ericsson | depends on the AMF role, it seems. |
| Qualcomm | Let’s wait for AMF role discussion in SA2. |
| Samsung | Depends on previous question. |
| Lenovo, Motorola Mobility | Need further checking. |
| ZTE | Wait for AMF role discussion in SA2. |

It should be possible to cope with graceful removal of AMFs while keeping active MBS Session Resources alive.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | OK. This would only be a problem if AMF maintains a context which we should avoid. |
| Huawei | Share the view with Nokia. |
| Ericsson | depends on AMF role |
| Qualcomm | Seems OK. Let’s wait for AMF role discussion in SA2. |
| ZTE | Wait for AMF role discussion in SA2. |
|  |  |

### Interaction between MBS Session Resource NGAP functions

The functional split between NG-RAN and 5GC triggered MBS Session Resource NGAP functions requires the following interactions:

- 5GC triggered MBS Session Resource Setup (Activation) interacts with (i.e. triggers) the gNB triggered setup of shared NG-U tunnel. ([9], [18], etc.), if not yet established (see “whether shared NG-U transport exists during an inactive MBS Session”)

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Yes |
| Nokia | NOK. Setup is not Activation as explained by SA2! |
| Huawei | NOK.  SA2 has agreed for only MBS session activation but not MBS session start for multicast.  For multicast, upon receiving PDU Session modify with MBS context, the NG-RAN node will trigger shared NG-U establishment.  For broadcast, the Broadcast Session start will provide MBS context and trigger shared NG-U establishment. |
| Ericsson | We would very much welcome agreement on that topic.  This approach was meant to be a compromise proposal, but the refusal of it is very disappointing. |
| Qualcomm | Agree. But, this seems not aligned with SA2, as Huawei/Nokia said. |
| Samsung | I see the benefit of MBS Session Resource Setup triggers the setup of shared NG-U tunnel. Agree this is not align with SA2, as Huawei/Nokia said. |
| Lenovo, Motorola Mobility | NOK.  Same understanding with Nokia, setup and activation should be two separate procedures. |
| CMCC | Same view as Nokia and Huawei |
| ZTE | Agree. |

### Interaction between NGAP MBS Session Resource and NGAP PDU Session/XnAP UE Context related functions

As agreed in previous meetings, during an active session, UEs joining as first UEs in a gNB or UEs being handed over to the target gNB as first UEs in the target gNB having joined a session, trigger the setup of MBS Session Resources.

Along the initially proposed function split between NG-RAN and 5GC triggered MBS procedures (see above), the NG-RAN triggers the setup of NG-U tunnel, whereas 5GC triggers the provision of MBS Session parameters to setup the MBS Session Resources.

The same applies for UEs leaving as last UEs in a gNB having joined a session [20], where the NG-RAN triggers the release of MBS Session Resources.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Yes |
| Nokia | NOK. MBS Session parameters are provided over Xn. |
| Huawei | NOK.  During Xn handover, the MBS context is forwarded from source to target RAN node. In case the first UE joining for an active session, the RAN node triggers shared NG-U tunnel establishment.  Once the last UE leaves, the RAN node triggers to release the shared NG-U tunnel. |
| Ericsson | I guess we never agreed or even envisaged to transfer MBS Session Resource Contexts via Xn, this is very new to me.  So, I still hope, tat this proposal is agreeable. |
| Qualcomm | Agree |
| Samsung | Transfer MBS context via Xn, or the NG-RAN triggers the setup of NG-U tunnel, whereas 5GC triggers the provision of MBS Session parameters to setup the MBS Session Resources, both are fine. But first we need to have the agreement on the previous basic question, e,g, 3.1.3 |
| Lenovo, Motorola Mobility | Agree |
| ZTE | When a UE joins as first UE in a gNB, whether to use NG-RAN triggered or 5GC triggered function to establish MBS session resource has not been finally decided by SA2.  When a UE handovers to the target gNB as first UE in the target gNB having joined a multicast session, the Path switch procedure can be enhanced to trigger the setup of MBS session resource. This is similar with PDU session handover where NG-U tunnel is established at the target gNB after UE accessing to the target gNB.  When the UE leaves as last UE in a gNB having joined a session. A class 2 NG-RAN triggered procedure can be used to trigger a class 1 5GC triggered release procedure.  Therefore, one possible way forward is:  **- For Xn HO, provision of MBS Session parameters is done through Xn, and NG-RAN triggers related MBS procedures.**  **- For NG HO, provision of MBS Session parameters is done through NG interface from 5GC, in which 5GC triggers related MBS procedures.** |

### Alignment of NGAP MBS Session Resource management function between broadcast and multicast:

There are two approaches to denote an MBS Session Resource instance on NG-C:

1. using the same NGAP MBS Session Resource management functions for broadcast and multicast, with the understanding, that for broadcast, only a subset of the multicast protocol functions is applicable.

2. separate NGAP MBS Session Resource management functions for broadcast and multicast

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | 1 |
| Nokia | Option 2. Broadcast and multicast are totally different as clarified to SA2. |
| Huawei | Option 2.  For broadcast: Broadcast Session Start/Stop.  For multicast: PDU session resource setup/modify/release, and Multicast Session activation/deactivation. |
| LG | Option 2.  NGAP MBS Session Resource management functions for broadcast and multicast are different. |
| moderator | he hides from the public in bitter tears of grave disappointment ... |
| Qualcomm | 1, if non-UE associated signaling procedure for MBS session resource management is agreed.  Otherwise, 2. |
| Samsung | Same view as QC. |
| Lenovo, Motorola Mobility | Option 2 |
| CMCC | Option 2 |
| ZTE | We prefer option 1, which has less specification efforts and better alignment understanding/description for MBS. |

### Establishment of NG-U transport for 5GC shared delivery

#### whether gNB is free to choose the shared NG-U transport

There are 2 approaches:

1. 5GC decides the transport

2. 5GC enables both options but RAN decides, i.e. the RAN either provides for unicast transport the DL TEID or requests the 5GC to provide IP multicast address.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | 2 |
| Nokia | Option 2. |
| Huawei | Option 2. |
| LG | Option 2 |
| Ericsson | Surprise, a common view! |
| Qualcomm | Option 2 |
| Samsung | Not sure how NG-RAN requests the 5GC to provide IP multicast address, a new procedure? |
| Lenovo, Motorola Mobility | Option 2 |
| CMCC | Option 2 |
| ZTE | Option 2. |

#### whether shared NG-U transport exists during an inactive MBS Session

There are 3 approaches:

1. NG-U always exists if at least one CM-CONNECTED UE that has joined the session is served by the gNB, irrespective the MBS Session State

2. NG-U only exists for active MBS sessions, i.e. from a protocol point of view, no MBS Session context exits in the gNB during inactive sessions

3. NG-RAN is allowed to release NG-U if the MBS Session is inactive

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | If the same principle with unicast is followed, no PDU session context exists in gNB if PDU session is in inactive state. However, we are open to consider other option i.e.MBS context exists for inactive MBS session in case benefit is foreseen. |
| Nokia | Option 1. |
| Huawei | As the RAN node is able to trigger the establishment and release of the shared NG-U, it can left for NG-RAN implementation.  Note that for inactive session, the MB-SMF shall not transmit MBS data to the RAN ndoe. |
| Ericsson | Option 2 or 3. |
| Qualcomm | Option 2 is preferred. We are open to consider other options |
| Samsung | Option 2 is preferred. Open to consider other options. |
| Lenovo, Motorola Mobility | Option 3 is preferred. |
| CMCC | Option 2 or 3. |
| ZTE | Option 2 or 3. |

### Handling of local/location dependent MBS Sessions

#### Provision of area information to the gNB

[10] and [19] propose to provide all area information to the gNB so that it is able apply service area restrictions (local MBS Sessions) or setup respective NG-U resources (for location dependent MBS Sessions).

Please provide your view below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | OK. |
| Huawei | To be discussed after SA2 progress, it is understood that local areas are not overlapped, but it is not clear whether different cells within a NG-RAN node will belong to different local areas. |
| Ericsson | would like to see this being followed, I guess that this can be handled independently from SA2 progress, as it represents a basic operational/functional requirement from RAN point of view. |
| Qualcomm | Seems fine. But, we should focus on the basic MBS multicast signaling first and wait for SA2 conclusion for local MBS session. |
| Samsung | Can wait for SA2. |
| Lenovo, Motorola Mobility | Ok |
| ZTE | To be discussed after SA2 progress. |

#### Handling of several NG-U tunnels for location dependent MBS sessions

An MBS Session may consist of several MBS session areas, each to be provided with different MBS traffic (content). I.e. a gNB may have established more than one NG-U tunnels for the same MBS Session Resource.

[19] proposes allow this per means of an NG-RAN triggered MBS procedure

Please provide your view below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Not clear what “this” means here? |
| Huawei | To be discussed after SA2 progress, see comments in 3.1.11.1. |
| moderator | The principle should be that *more than one NG-U tunnels for the same MBS Session Resource* may be established towards the same gNB. It is believed that the terms are well known are reasonably used in this statement. |
| Ericsson | yes please, this principle is fine. |
| Qualcomm | Same comment as last question. |
| Samsung | Can wait for SA2. |
| Lenovo, Motorola Mobility | Wait for SA2 first |
| ZTE | To be discussed after SA2 progress. |

## Management of associated PDU Session Resources

### Management of associated PDU Session Resources for interworking with non-supporting gNBs

First question is how to include associated MBS Session information within the existing PDU Session Resource messages/IEs. There are two approaches outlined:

1. as part of the legacy QoS Flow List IEs

2. Outside the legacy QoS Flow List IEs

With the common understanding, that a non-supporting RAN node should not establish resources for an associated QoS flow if the MBS Session is inactive, it is proposed to follow approach number 2.

Please provide your view below.

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Option 2. In our tdoc 1657 we provide outside. |
| Huawei | Option 1, in that case, in non-supporting node, the MBS QoS flows will be regarded as unicast flow by default. |
| Ericsson | Option 2.  Option 1 would require to include the associated QoS in a way, that the resources would be established in the non-supporting nodes, even if the MBS Session is inactive. |
| Qualcomm | Option 2 |
| Samsung | Option 1. |
| Lenovo, Motorola Mobility | Option 2 |
| ZTE | neutral |

There seems to be a common understanding to confirm the still a bit openly worded statement from RAN3#111:

- we should have explicit NG-RAN reply in PDU Session Resource SMF containers to inform the SMF whether MBS is supported

Please provide your view below.

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | OK. |
| Huawei | Agree, we proposed to introduce a *MBS supported* IE in the *PDU Session Resource Modify Response Transfer* IE and *PDU Session Resource Setup Response Transfer* IE. See R3-212424/2425. |
| Ericsson | what ever this indication is called, it is ok. |
| Qualcomm | Agree |
| Samsung | Agree with Huawei. |
| Lenovo, Motorola Mobility | Agree |
| ZTE | Maybe this shall be AMF's job?  Suggest waiting for SA2 progress, as it is being discussed. |

### Management of associated PDU Session Resources within supporting gNBs / homogenous deployment

For homogenous deployment, associated QoS flows are not necessary, as no interworking is required. It is proposed to acknowledge that the MBS related information within the associated PDU Session Resource Context may consist of the MBS Session ID(s) only, i.e. w/o associated QoS flow information, if interworking with non-supporting NG-RAN nodes is not required.

Please provide your view below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | This is allowed in our tdoc 1657. |
| Huawei | NOK. UE may handover to non-supporting NG-RAN nodes, or other RAT. |
| Ericsson | very nice to read from Nokia. Interworking with other RAT needs to be looked at, but in case of homogenous deployment, i.e. no interworking is required, this is not necessary. |
| Qualcomm | OK for homogenous deployment. |
| Samsung | Ok for homogenous deployment. |
| Lenovo, Motorola Mobility | OK for homogenous deployment |
| CMCC | OK for homogenous deployment. But need to consider inter-RAT case |
| ZTE | OK for homogenous deployment |

PDU Session Resources are de-activated in case of no (unicast UP) activity. The same approach should be possible for associated PDU Session Resources as well, if no interworking with non-supporting NG-RAN nodes is necessary. This allows consistent behaviour throughout all PDU Sessions, consistent admission control, reasonable use of radio resources, etc. It only requires join information to be present within a gNB outside the PDU Session Context data.

In order to support release, i.e. not keeping associated PDU Session Resources active for CM-CONNECTED UEs in homogenous deployment, it is proposed to enable provision of join information from 5GC within the UE Context outside the PDU Session Resource context data.

Please provide your view below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | NOK. Not clear and this is not the model of SA2 |
| Huawei | NOK. |
| Ericsson | This is one of the major and non-negotiable requirements from our point of view. Having PDU Session resources admitted just for the sake of providing the join information to NG-RAN is too costly and not acceptable. |
| Qualcomm | NOK. Needs to check with SA2. |
| Samsung | Not align with SA2. |
| Lenovo, Motorola Mobility | Need further checking. |
| CMCC | Need further checking. |
| ZTE | Share the same view of Ericsson. |
|  |  |

### 5GC Individual MBS traffic delivery aspects.

We have one open item

*Whether in case a PDU Session maps to more than one MBS Session, this corresponds for 5GC individual MBS traffic delivery to one or several (individual) NG-U/N3 tunnels needs further discussion.*

[7] suggests to remove this open item and replace it by the agreement (moderator re-worded):

In case of 5GC individual MBS traffic delivery, if an PDU Session is associated with more than one MBS Sessions, if applicable, MBS traffic for all MBS Sessions is delivered (concurrently) via the one NG-U/N3 tunnel established for the associated PDU session.

Please provide your view below:

|  |  |
| --- | --- |
| Company | Comment |
| CATT | OK |
| Nokia | OK. Thanks for the rewording. |
| Huawei | Agree |
| Ericsson | ok |
| Qualcomm | OK |
| Samsung | OK |
| Lenovo, Motorola Mobility | OK |
| CMCC | Ok |
| ZTE | Agree. Thanks for the rewording. |
|  |  |

## TS 38.410 aspects [on hold for now]

Text proposals should follow easily once the basic procedure structure is agreed.

## TS 38.413 aspects for multicast [on hold for now]

Basic text proposals should follow in a straight forward way once the basic procedure structure is agreed.

## TS 38.413 aspects for broadcast [on hold for now]

Once basic agreement on alignment between multicast and broadcast procedures have been made, we could continue discussing TP in [14].

## TS 38.414 aspects

[8] provides a TP for TS 38.414, suggesting to add the following specification text:

- in §5.1, below the NG-U protocol stack (moderator edited):  
For broadcast or 5GC shared MBS traffic delivery with multicast transport, the transport bearer is identified by the GTP-U TEID (TS 29.281 [2]) and the IP multicast address (source TEID, IP address of multicast source, IP multicast address).

- in §5.3 “UDP/IP” (moderator edited):  
IP multicast shall be supported for broadcast or 5GC shared MBS traffic delivery on NG-U.  
Editor’s Note: IETF reference for IP multicast is FFS.

Please provide your view below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | NOK. One cannot mandate the support of IP multicast transport. |
| Huawei | Can be discussed later. |
| Ericsson | not major point, I agree, but a starting point for discussion. |
| Qualcomm | OK, as starting point. |
| Lenovo, Motorola Mobility | OK as starting point. |
| ZTE | OK, as starting point. This is for capturing the agreement: "For N3 transport of the shared delivery method, GTP-U tunnelling using a transport layer IP multicast method and shared N3 (GTP-U) Point-to-Point tunnel shall be supported with support for QoS."  Thanks for moderator’s rewording. |

## other topics [if needed]

If necessary, please provide additional important topics, the moderator might have forgotten. Could also be put into subsections above.

# Conclusion, Recommendations [if needed]

If needed

# References

1. [R3-211426](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211426.zip) “Reply LS on 5MBS progress and issues to address” (RAN2), LS in
2. [R3-211453](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211453.zip) “Reply LS on 5MBS progress and issues to address” (SA2), LS in
3. [R3-211515](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211515.zip) “Reply LS on 5MBS progress and issues to address” (RAN2), LS in
4. [R3-212092](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212092.zip) “Discussion on the current status in SA2 and RAN2” (Ericsson), discussion
5. [R3-212422](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212422.zip) “Discussion about LSs on 5MBS progress and issues to address” (Huawei), discussion
6. [R3-212480](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212480.zip) “Discussion on SA2 reply LS on 5MBS progress and issues to address” (CMCC), discussion
7. [R3-211542](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211542.zip) “MBS session management and TP to 38.410 38.413 BL CR” (ZTE), discussion
8. [R3-211543](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211543.zip) “TP to 38.414 MBS BL CR on IP multicast” (ZTE), discussion
9. [R3-211656](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211656.zip) “(TP for 38.300 & 38.410) Stage 2 for Multicast and Broadcast” (Nokia, Nokia Shanghai Bell), other
10. [R3-211657](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211657.zip) “(TP for 38.413) Setup of MBS Context and UE MBS Context” (Nokia, Nokia Shanghai Bell), other
11. [R3-211658](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211658.zip) “(TP for 38.413) Management of User Plane Shared Delivery Tunnel” (Nokia, Nokia Shanghai Bell), other
12. [R3-211751](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211751.zip) “NR Multicast Session Management Procedure” (Qualcomm Incorporated), discussion
13. [R3-211877](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211877.zip) “Discussion on MBS session management for multicast” (CATT) ,discussion
14. [R3-211876](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211876.zip) “TP for 38.413 on session management for broadcast service” (CATT,CBN, Huawei), other
15. [R3-212424](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212424.zip) “(TP to TS 38.410 BL CRs) Multicast Session Management” (Huawei, CBN), other
16. [R3-212425](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212425.zip) “(TP to TS 38.413 BL CRs) Multicast Session Management” (Huawei, CBN), other
17. [R3-211971](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-211971.zip) “TP for MBS BLCR for 38.413-Session management for MBS over NG” (Samsung), other
18. [R3-212101](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212101.zip) “[TP for BL CR for 38.300 and TS 38.410] Session Management over NG and its application on Xn” (Ericsson), other
19. [R3-212102](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212102.zip) “[TP for BL CR for 38.413 and TS 38.423] on MBS Session Management” (Ericsson), other
20. [R3-212181](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212181.zip) “Multicast Session Management over NG” (Lenovo, Motorola Mobility), discussion
21. [R3-212385](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212385.zip) “Discussion on a group notification towards NG-RAN supporting MBS” (LG Electronics), discussion
22. [R3-212482](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212482.zip) “MBS Session management over NG” (CMCC), discussion
23. [R3-212484](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212484.zip) “(TP to TS 38.300 ) MBS session management over NG” (CMCC, Huawei), other
24. [R3-212483](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_112-e/Docs/R3-212483.zip) “(TP to TS 38.410 ) MBS session management over NG” (CMCC), other