3GPP TSG-RAN WG2 Meeting #127bis R2-240xxxx

Hefei, China, Oct 14th – 18th, 2024

Source: RAN2 Chair (InterDigital)

Title: Agenda

# AT-meeting offline discussions:

* [AT127bis][500] Organizational – Session on R18 MBS, R18 QoE and R19 XR

Scope:

* + - Share plans and list of ongoing email discussions for the session on R18 MBS, R18 QoE and R19 XR
    - Share meeting notes and agreements for review and endorsement
* [AT127bis][501][XR] Reply LS to SA2 (Huawei) 🡪 Closed

Scope: Reply LS to SA2

Intended outcome: Agreeable LS

Deadline: CB session on Thursday

* [AT127bis][502][XR] Reply LS to SA4 (Nokia) 🡪 Closed

Scope: Reply LS to SA4

Intended outcome: Agreeable LS

Deadline: CB Thursday

* [AT127bis][503][QoE] Correction on priority-based QoE measurements in TS 38.300 (Huawei) 🡪 Closed

Scope: Improve wording from R2-2408841

Intended outcome: Agreeable CR

Deadline: Friday 2024-10-18 0900

* [AT127bis][504][MBS] Paging clarification for MBS (Sharp) 🡪 Closed

Scope: Discuss the wording for 2nd change from R2-2408242

Intended outcome: Agreeable CR

Deadline: Friday 2024-10-18 0900

* [AT127bis][505][MBS] Stage-2 correction (Samsung) 🡪 Closed

Scope: Prepare CRs (R17 and R18) based on TPs in R2-2408757

Intended outcome: Agreeable CRs

Deadline: Friday 2024-10-18 0900

* [AT127bis][507][XR] LS to SA4 on bit rate values (QCM) 🡪 Closed

Scope: LS to SA4 on bit rate values

Intended outcome: Agreeable LS

Deadline: Friday 2024-10-18 0900

## 2.4 Instructions

CRs

* Use latest CR template version 12.3 for all CRs submitted to RAN2 meeting

Rel-17 maintenance CRs

* Only essential/critical corrections are expected
* Editorial and clarification corrections should be sent to be reviewed and approved by spec rapporteurs prior to submission.
* Editorials corrections should be collected and submitted by spec rapporteurs.

Rel-18 CR Handling

- CR editors / Rapporteurs are to gather miscellaneous and non-controversial issues, if any, for their respective specification prior to submission deadline. Other companies are expected to give inputs to these CRs and not have contributions on such issues.

- The organizational AIs for each WIs are reserved for rapporteurs only. CR rapporteurs are expected to submit only 1 CR per spec.

- Companies can submit CRs or contributions with TPs (if indicated in agenda (e.g. R18 mobility, SL)) for corrections of Rel-18 items with clear cover page describing the issues. CRs covering similar issues may be merged together. Editorials and clarifications should be provided to the CR editors/rapporteurs and NOT be included in the individual CRs/contributions.

- RRC ASN.1 changes should be drafted in BC way.

- Inter-op analysis on Rel-18 CR cover pages is now required for each CR. Companies are expected to identify inter-op analysis/impact in their CRs/tdoc for each proposed change. CRs rapporteurs when merging should highlight the changes that have interoperability issues.

Rel-18 UE capabilities

- EUTRA UE capabilities corrections are covered by separate CRs

- RAN1/RAN4 NR UE capabilities (new) and corrections are covered in Rel-18 common MegaCRs (38306 and 38331) covering all rel-18 WIs (end outcome).

- UE capabilities in LPP 37355 and SLPP 38355 are covered in the main CRs for the Positioning WI.

During the work on NR UE caps:

- In a Common Rel-18 Agenda Item (AI): RAN1 and RAN4 feature corrections are handled jointly under a common AI, with some explicit exceptions. Running UE cap MegaCRs are maintained for the parts handled in the common AI.

- In WI-specific Rel-18 Agenda Items: RAN2 features/corrections are handled per WI and only a draft CR per WI is expected and will be agreed individually.

Tdoc limitations

Tdoc limitations doesn’t apply to Rapporteur Input, i.e.

- Assigned summary rapporteur input of the summary.

- Email / offline discussions outcomes by discussion rapporteur,

- Limit of 1 WI/SI rapporteurs input for WI planning. The work plan is not expected to be updated/submitted every meeting, unless needed. It can include progress of other WG groups in the same Tdoc (i.e. separate Tdocs on other WG agreements are not required).

- TS rapporteur input for TS maintenance.

- Contact Company of a LSin that triggers RAN2 action may submit one tdoc to facilitate the LS reply. This only applies to one of the contact companies in case there are several (default the first).

Tdoc limitations doesn’t apply to Input created at the meeting, revisions, assigned documents etc.

Tdoc limitations doesn’t apply to shadow / mirror CRs (Cat A), or In-Principle Agreed CRs.

Tdoc limitations applies to all other submitted tdocs (e.g. discussion tdoc and CR tdoc are counted as two).

Tdoc request/submission for RAN2#127bis deadlines:

* Tdoc Submission deadline: Oct. 4th, 1000 UTC

## 7.11 Enhancements of NR Multicast and Broadcast Services

(NR\_MBS\_enh-Core; leading WG: RAN2; REL-18; WID: RP-231829)

Time budget: 0 TU

Tdoc Limitation: 1 tdoc

### 7.11.1 Organizational

LS in, rapporteur input

[R2-2408113](file:///D:\3GPP\Extracts\R2-2408113%20Rapporteur%20correction%20on%20the%20terminology%20of%20multicast%20MCCH.docx) Rapporteur correction on the terminology of multicast MCCH Huawei, HiSilicon, Samsung CR Rel-18 38.331 18.3.0 4985 - F NR\_MBS\_enh-Core

* Revised in R2-2409389

[R2-2409389](file:///D:\3GPP\Extracts\R2-2409389%20Rapporteur%20correction%20on%20multicast%20MCCH.docx) Rapporteur correction on multicast MCCH Huawei, HiSilicon, Samsung, CATT CR Rel-18 38.331 18.3.0 4985 1 F NR\_MBS\_enh-Core

* Agreed in principle

### 7.11.2 Corrections

Corrections for all specifications

[R2-2407995](file:///D:\3GPP\Extracts\R2-2407995%20Correction%20on%20Multicast%20MCCH%20Information%20Acquisition.docx) Correction on Multicast MCCH Information Acquisition CATT,CBN CR Rel-18 38.331 18.3.0 4983 - F NR\_MBS\_enh-Core

* Intention is agreeable
* In the change in 5.10.2.2, clarify the paging refers to paging including group paging
* Merge into rapporteur CR
* Xiaomi agrees with the intention, but we can clarify this refers to group paging only.

[R2-2408112](file:///D:\3GPP\Extracts\R2-2408112%20Correction%20on%20multicast%20reception%20in%20RRC_INACTIVE%20upon%20paging.docx) Correction on multicast reception in RRC\_INACTIVE upon paging Huawei, HiSilicon, Nokia, CATT, Ericsson, Samsung, Apple, ZTE CR Rel-18 38.331 18.3.0 4984 - F NR\_MBS\_enh-Core

* Change “MCCH” to “multicast MCCH”
* With that change, the CR is in principle agreed
* Revised in R2-2409388
* Sharp think the current note does not align with the agreement, because resume cause is not mentioned. Sharp would prefer to capture it in procedural text.

[R2-2409388](file:///D:\3GPP\Extracts\R2-2409388%20Correction%20on%20multicast%20reception%20in%20RRC_INACTIVE%20upon%20paging.docx) Correction on multicast reception in RRC\_INACTIVE upon paging Huawei, HiSilicon, Nokia, CATT, Ericsson, Samsung, Apple, ZTE CR Rel-18 38.331 18.3.0 4984 1 F NR\_MBS\_enh-Core

* In principle agreed

[R2-2408242](file:///D:\3GPP\Extracts\R2-2408242%20Miscellaneous%20correction%20on%20eMBS.docx) Miscellaneous correction on eMBS SHARP Corporation draftCR Rel-18 38.331 18.3.0 F NR\_MBS\_enh-Core

* Revised in R2-2409275

DISCUSSION on change 2:

* Samsung agrees with this change, all the three conditions need to be met for UE to initiate mt-SDT access.
* Ericsson is worried that we may need to also update other places
* ZTE thinks the proposed change is correct, but there is some redundant description there.

DISCUSSION on change 3:

* Huawei agrees with the change
* 1st change is not needed/not pursued
* The intention of the 2nd change is agreeable, FFS how to word it exactly
* 3rd change is agreed
* [AT127bis][504][MBS] Paging clarification for MBS (Sharp)

Scope: Discuss the wording for 2nd change from R2-2408242

Intended outcome: Agreeable CR

Deadline: Friday 2024-10-18 0900

[R2-2409275](D:\\3GPP\\Extracts\\R2-2409275.docx" \o "D:\3GPP\Extracts\R2-2409275.docx) Paging clarification for MBS SHARP Corporation CR Rel-18 38.331 18.3.0 5097 - F NR\_MBS\_enh-Core

* Agreed in principle

[R2-2408407](file:///D:\3GPP\Extracts\R2-2408407%20Conflicts%20between%20legacy%20and%20enhanced%20group%20paging.doc) Conflicts between legacy and enhanced group paging ZTE Corporation, Sanechips discussion Rel-18 NR\_MBS\_enh-Core

* Noted

Proposal 1 RAN2 to confirm the paging conflicts issue: one gNB that is about to enable Rel-18 RRC\_INACTIVE reception might fail to do so, when it is requested by other gNB to have Rel-17 group paging, e.g., upon session activation.

Proposal 2 RAN2 to discuss about confining related UE’s RNA area to be within the scope of one gNB.

DISCUSSION:

* CATT thinks the spotted issue is valid, but the proposed solution makes RNA useless. It can be left to gNB implementation to move the UE back to RRC INACTIVE.
* Huawei agrees it can be left up to NW implementation. Serving gNB makes the final decision.
* Ericsson thinks RAN3 is also discussing this. There is no issue for R17 group paging.
* ZTE confirms the issue is only for R18 Paging.
* Ericsson indicates RAN3 concluded each gNB can make the decision.
* From RAN2 point of view, nothing needs to be done on conflicts between legacy and enhanced group paging

[R2-2408757](file:///D:\3GPP\Extracts\R2-2408757%20Corrections%20for%20MII.docx) Corrections for MII Samsung discussion Rel-18

* The changes are agreeable
* We will have CRs from Rel-17
* On 1st TP, Nokia asks about the use case. Samsung clarifies that based on MII the gNB decides whether to add or release MRBs.
* [AT127bis][505][MBS] Stage-2 correction (Samsung)

Scope: Prepare CRs (R17 and R18) based on TPs in R2-2408757

Intended outcome: Agreeable CRs

Deadline: Friday 2024-10-18 0900

[R2-2409276](file:///D:\3GPP\Extracts\R2-2409276%20(Rel-17)%20Clarification%20on%20MII%20usage.docx) Clarification on MII usage Samsung CR Rel-17 38.300 17.10.0 0924 - F NR\_MBS\_enh-Core

* Agreed in principle

[R2-2409277](file:///D:\3GPP\Extracts\R2-2409277%20(Rel-18)%20Clarification%20on%20MII%20usage.docx) Clarification on MII usage Samsung CR Rel-18 38.300 18.3.0 0925 - A NR\_MBS\_enh-Core

* Agreed in principle

[R2-2409278](file:///D:\3GPP\Extracts\R2-2409278%20(Rel-17)%20Clarification%20on%20determining%20about%20to%20start%20sessions.docx) Clarification on determining about to start sessions Samsung CR Rel-17 38.331 17.10.0 5092 - F NR\_MBS\_enh-Core

* Agreed in principle

[R2-2409279](file:///D:\3GPP\Extracts\R2-2409279%20(Rel-18)%20Clarification%20on%20determining%20about%20to%20start%20sessions.docx) Clarification on determining about to start sessions Samsung CR Rel-18 38.331 18.3.0 5093 - A NR\_MBS\_enh-Core

* Agreed in principle

[R2-2409057](file:///D:\3GPP\Extracts\R2-2409057%20Validity%20of%20MBS%20configuration%20in%20RRCRelease.docx) Validity of PTM configuration in RRCRelease Ericsson CR Rel-18 38.331 18.3.0 5072 - F NR\_MBS\_enh-Core

* Not pursued
* CATT agrees with the intention, but the wording is unclear. CATT thinks we need to clarfy that the UE still has this configuration.
* Nokia wonders how long the UE stores this configuration. Nokia thinks reusing this config may cause some issues in some scenarios. Ericsson indicates that we could argue the same for Paging as well as it is also not specified how long UE stores. Ericsson just wants to align with Paging case.
* Samsung thinks it can be left to UE how long to store the configuration and whether reuse it.
* ZTE finds the CR confusing. ZTE thinks that upon cell reselection the UE needs to get a new configuration. Nokia agrees.
* Ericsson thinks nothing is broken if we do not agree on the CR, but it is unclear why we treat Paging and cell reselection case differently.

After offline:

* Ericsson’s impression is that there is no enough support for having this change.

[R2-2409085](file:///D:\3GPP\Extracts\R2-2409085%20%20Details%20of%20multicast%20reception%20in%20RRC_INACTIVE%20state.docx) Details of multicast reception in RRC\_INACTIVE Nokia discussion Rel-18 NR\_MBS\_enh-Core

* Noted
* Huawei thinks it is a corner case and for this case option 2 from Nokia works, i.e. NW can page in the whole RNA.
* Ericsson is not sure that this is a corner case and Ericsson prefers to limit the Paging in the NW.
* ZTE agrees with Ericsson this is not a corner case and option 1 is better to reduce load in the NW.
* Xiaomi agrees with Huawei that NW can page in the whole RNA and since it will not happen very frequently we can accept this additional overhead.
* Samsung prefers option 1.
* Huawei think that with option 1, the gNB anyway needs to sends paging RNA. Or do other companies think that with option 1 the gNB will only send Paging in cell 1? Nokia clarifies that at least in cell 2 Paging does not have to be sent.
* When UE checks MCCH in the cell 2, if it cannot find PTM config for this TMGI, it resumes (even though session was indicated stop monitoring in cell 1).
* The CR can be provided to the next meeting

After offline:

* Nokia thinks the views are the same as previously. Companies also proposed to generalize the text.
* Huawei has some concerns on network congestion, there are too many cases for UE to resume. With this optimization, it is against this motivation. Think network implementation can solve this.
* Ericsson has some sympathy for comments from Huawei, but on the other hand this handles a case where the cell was not fully overloaded. Ericsson is not sure if it can be handled with Paging.
* Nokia thinks it is beneficial even if it can be solved with Paging to reduce Paging load. ZTE has similar view as Jarkko.

## 7.14 Enhancement on NR QoE management and optimizations for diverse services

(NR\_QoE\_enh-Core; leading WG: RAN3; REL-18; WID: RP-223488)

Time budget: 0 TU

Tdoc Limitation: 1 tdoc

### 7.14.1 Organizational

LSs and rapporteur inputs

[R2-2407923](file:///D:\3GPP\Extracts\R2-2407923_R3-244789.docx) LS on MBS Communication Service Type (R3-244789; contact: Ericsson) RAN3 LS in Rel-18 NR\_QoE\_enh-Core To:SA4 Cc:SA5, RAN2

* Noted

[R2-2408745](file:///D:\3GPP\Extracts\R2-2408745%20-%20Correction%20CR%20for%20QoE%20measurements.docx) Correction of Enhancement on NR QoE management and optimizations for diverse services Ericsson CR Rel-18 38.331 18.3.0 5030 - F NR\_QoE\_enh-Core

* The CR is agreed in principle
* Add ZTE as a co-sourcing company when submitting next meeting

### 7.14.2 Corrections

*Corrections to all specifications.*

[R2-2408658](file:///D:\3GPP\Extracts\R2-2408658%20QoE%20configuration%20release%20during%20inter-RAT%20mobility.docx) Consideration on QoE configuration release during inter-RAT mobility ZTE Corporation, Sanechips discussion Rel-18 NR\_QoE\_enh-Core

* Noted

Proposal 1: Capture in 5.5b.1.2 of NR specs that UE shall release its stored NR QoE configuration and possible QoE reports/variables if reselects to EUTRA cell.

Proposal 1a: RAN2 agrees on P1 and adopts the TP in the Annex.

Proposal 2: RAN2 discusses and selects among below three options to release QoE configuration during mobility from EUTRA to NR:

 Option1: Capture UE behavior in chairman’s notes with no specs impact.

 Option 2: Capture UE behavior in procedure text as in R2-2407090.

 Option 3: Capture UE behavior in a note: "NOTE x: Release all radio resource as specified in this subclause includes release of application layer measurement configurations configured by source RAT (e.g., serviceType) prior to the handover, including informing upper layers about release of the application layer measurement configurations and discarding application layer measurement reports if any. "

* Based on offline discussions ZTE thinks P1 and option 2 in P2 can be agreed.
* Capture in 5.5b.1.2 of NR specs that UE shall release its stored NR QoE configuration and possible QoE reports/variables if reselects to EUTRA cell.
* To release QoE configuration during mobility from EUTRA to NR, Capture UE behavior in procedure text as in R2-2408833.

[R2-2408746](file:///D:\3GPP\Extracts\R2-2408746%20-%20Discussion%20on%20IRAT%20handover%20from%20LTE.docx) Discussion on IRAT handover from LTE Ericsson, Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_QoE\_enh-Core

* Noted, handled based on R2-2408658

[R2-2408833](file:///D:\3GPP\Extracts\R2-2408833%20Correction%20on%20QoE%20measurements%20release%20at%20successful%20handover%20from%20LTE%20to%20NR.docx) Correction on QoE measurements release at successful handover from LTE/5GC to NR Nokia, Nokia Shanghai Bell, Ericsson CR Rel-18 36.331 18.3.1 5062 - F NR\_QoE\_enh-Core

* CR is agreed in principle

[R2-2408841](file:///D:\3GPP\Extracts\R2-2408841%20Correction%20on%20priority-based%20QoE%20measurements%20in%20TS%2038.300.docx) Correction on priority-based QoE measurements in TS 38.300 Huawei, HiSilicon CR Rel-18 38.300 18.3.0 0919 - F NR\_QoE\_enh-Core

* Intention is agreeable, but wording and where it should be captured needs further discussion
* Revised in R2-2409274
* Huawei thinks companies agree with the intention, but wording needs some work.
* Samsung asks whether we can apply this to both s-based and m-based QoE. Huawei clarifies that for both, so that is why we need to think where to capture it.
* [AT127bis][503][QoE] Correction on priority-based QoE measurements in TS 38.300 (Huawei)

Scope: Improve wording from R2-2408841

Intended outcome: Agreeable CR

Deadline: Friday 2024-10-18 0900

R2-2409274 Correction on priority-based QoE measurements in TS 38.300 Huawei, HiSilicon, China Unicom, Nokia, Ericsson, ZTE, Apple CR Rel-18 38.300 18.3.0 0919 1 F NR\_QoE\_enh-Core

* Agreed in principle

## 7.24 TEI18

Specific items may be allocated to a breakout session for treatment. Essential corrections only. No new proposals will be treated.

Time budget: 1 TU

Tdoc limitation: 2

#### 7.24.2.2 Other RAN2 TEI-18

Contributions should focus only critical issues/corrections for already agreed TEI-18 topics. Co-sourcing of such proposals is encouraged. Contributions on items that were explicitly downprioritized from Rel-18 WIs should not be brought as TEI18. No new Cat. B proposals expected for this meeting

[R2-2408408](file:///D:\3GPP\Extracts\R2-2408408%20Search%20space%20configuration%20for%20RedCap%20UE’s%20MBS%20broadcast%20reception.doc) Search space configuration for RedCap UE’s MBS broadcast reception ZTE Corporation, Sanechips discussion Rel-18 TEI18

* Noted

Proposal 1 RAN2 understanding: UE keeps monitoring MCCH in the whole MCCH transmission window until UE correctly receives the MCCH message. No spec impacts are expected.

* Huawei thinks that smart UE implementation will do this as DCI is periodic.
* Ericsson thinks from RAN2 perspective it is clear what UE should do. How the UE reacts to DCI decoding issue, it is not RAN2 scope.
* Xiaomi agrees with Huawei.
* ZTE asks why we cannot then align with text for System Information.
* RAN2 does not intend to specify anything about MCCH decoding error for overlapping RedCap and non-RedCap MCCH

# 8 Rel-19

## 8.7 XR Enhancements Ph3

(NR\_XR\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-241771)

Time budget: 2 TU

Tdoc Limitation: 5 tdocs

### 8.7.1 Organizational

LS, Rapporteur input, including workplan, etc.

**Rapporteur input**

[R2-2408645](file:///D:\3GPP\Extracts\R2-2408645%20XR%20Rapporteur%20Inputs.docx) Rapporteur Inputs Nokia, Qualcomm (Rapporteurs) discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

**LS in – RAN2 in “Cc”**

[R2-2407927](file:///D:\3GPP\Extracts\R2-2407927_R3-244844.docx) Response LS to SA2 on FS\_XRM Ph2 (R3-244844; contact: ZTE) RAN3 LS in Rel-19 FS\_XRM\_Ph2 To:SA2 Cc:RAN2, SA4

* Noted

[R2-2407940](file:///D:\3GPP\Extracts\R2-2407940_S4-241785.doc) LS on Application-Layer FEC Awareness at RAN (S4-241785; contact: Qualcomm) SA4 LS in Rel-19 FS\_XRM\_Ph2, NR\_XR\_Ph3-Core, FS\_5G\_RTP\_Ph2 To:SA2 Cc:RAN2, RAN3

* Noted

**LS in – RAN2 in “To”**

[R2-2407936](file:///D:\3GPP\Extracts\R2-2407936_S2-2409444.docx) LS reply on multi-modality awareness at RAN (S2-2409444; contact: Huawei) SA2 LS in Rel-19 NR\_XR\_Ph3-Core, XRM\_Ph2 To:RAN2, SA4, RAN3 Cc:RAN

* Noted

[R2-2408782](file:///D:\3GPP\Extracts\R2-2408782%20Discussion%20on%20reply%20LS%20on%20multi-modality%20awareness.docx) Discussion on reply LS on multi-modality awareness Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 1: RAN2 to reply to SA2 about the previous agreements on the usages of multi-modality information, including:

• MMSID can be used for joint admission control and QoS flow to DRB mapping.

• Multi-modality information is considered to be used for traffic synchronization and PDU set discard if it is confirmed by SA2/SA4 that information such as synchronization threshold and inter-PDU set dependency can be available from CN and/or at the UE.

DISCUSSION:

* QCM thinks that key discussion point in SA2 is MMSID which is per QoS flow. QCM thinks second RAN2 agreement does not have to be included in the reply LS. Nokia agrees.
* Vivo agrees with the proposal from Huawei. Vivo indicates that it is mentioned in WID objective that we will evaluate also PDU set discard. OPPO agrees.
* ZTE would like to also indicate that if MMSID is not available from CN, we will specify it in UAI.
* Lenovo agree we should list all we agreed.
* Meta supports mentioning UAI in case MMSID is not available from CN.
* Ericsson thinks that we should clarify that RAN2 does not expect any specifications impact from those enhancements.
* Samsung thinks SA2 already indicated they can provide MMSID.
* MTK thinks we can focus on MMSID, not UAI. Futurewei does not think we need to mention UAI.
* QCM thinks UAI is mainly for UL, MMSID is needed for DL.
* Huawei thinks UAI is mainly for UL while MMSID will be for DL
* Samsung thinks MSSID and UAI can be complementary
* CMCC supports indicating that UAI can also be used
* TCL also would like to mention it
* We will include all the relevant agreements on how we intend to use the information in the reply LS, i.e. related to both MMSID and synchronization thresholds
* [AT127bis][501][XR] Reply LS to SA2 (Huawei)

Scope: Reply LS to SA2

Intended outcome: Agreeable LS

Deadline: CB session on Thursday

[R2-2409272](file:///D:\3GPP\Extracts\R2-2409272%20Reply%20to%20SA2%20LS%20on%20multi-modality%20awareness.docx) Reply to SA2 LS on multi-modality awareness RAN2 LS out Rel-19 NR\_XR\_Ph3-Core To:SA2, RAN3, SA4

* Approved

[R2-2407939](file:///D:\3GPP\Extracts\R2-2407939_S4-241776.docx) LS Reply on FS\_XRM\_Ph2 (S4-241776; contact: Nokia) SA4 LS in Rel-19 FS\_XRM\_Ph2, FS\_5G\_RTP\_Ph2 To:SA2, RAN2 Cc:RAN3

To RAN2:

* Noted

ACTION: SA4 kindly asks RAN2 whether TTNB is still useful if received in the last packet of the burst and provide feedback on the replies above if any.

* Nokia thinks we can conclude that TTNB is useful if it comes at the end of the burst
* CATT thinks that we already replied.
* OPPO does not think it is useful if it is at the end of the burst.
* ZTE thinks we can reply again with the similar reply.
* Sharp thinks usefulness depends on the time till next burst.
* Huawei agrees it is useful but we should emphasize what we replied before, i.e. it is early enough and precise.
* LGE
* RAN2 previous reply still holds also for the case where TTNB is provided at the end of the burst
* [AT127bis][502][XR] Reply LS to SA4 (Nokia)

Scope: Reply LS to SA4

Intended outcome: Agreeable LS

Deadline: CB Thursday

[R2-2409271](file:///D:\3GPP\Extracts\R2-2409271%20LS%20Reply%20to%20SA4%20on%20TTNB.docx) [DRAFT] Reply on FS\_XRM\_Ph2

* Change “RAN2 confirms that TTNB is also useful in case TTNB is provided at the end of the burst.” to “RAN2 confirms that reply provided earlier still holds for the case where TTNB is provided at the end of the burst.”
* With this change the LS is approved in R2-2409390
* Xiaomi asks if we need to mention the condition that we agreed already.
* Nokia thinks we do not have to repeat what we already indicated.
* Samsung shares the same concern from Xiaomi.
* ZTE, Nokia think that this reply Is clear, i.e. the end of the burst is still OK.
* LGE, Ericsson thinks what we have is OK.
* FTW thinks our current answer is too strong.
* FTW prefers to add that it has to be early enough and is accurate.

R2-2409390 Reply on FS\_XRM\_Ph2 SA4 LS out Rel-19 NR\_XR\_Ph3-Core To:SA4 Cc:SA2, RAN3

* Approved

|  |
| --- |
| **Agreements for reply LSes**   1. We will include all the relevant agreements on how we intend to use the information in the reply LS, i.e. related to both MMSID and synchronization thresholds 2. RAN2 previous reply still holds also for the case where TTNB is provided at the end of the burst |

### 8.7.2 Multi-modality support

**No contributions are expected for this AI for RAN2#127bis, RAN2 is only expected to provide input to SA2/SA4 by replying to SA2 LS, as per the latest WID:**

- Specify support for multimodality in RAN for UL and DL [RAN3]:

NOTE: This is subject to alignment with SA2, e.g., if MMSID is not available from CN, then UE assistance information-based approach as an alternative. RAN#106 to check handling of uplink discard based on SA2/SA4 outputs on whether the corresponding information is available at the UE.

[R2-2408120](file:///D:\3GPP\Extracts\R2-2408120_Discussion%20on%20LS%20from%20SA2%20on%20multi-modality.docx) Discussion on LS from SA2 on multi-modality vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408535](file:///D:\3GPP\Extracts\R2-2408535_xrMultiModality_v00.docx) Reply LS on multi-modality support ZTE Corporation, Sanechips discussion

[R2-2408627](file:///D:\3GPP\Extracts\R2-2408627%20Discussion%20on%20LS%20from%20SA2%20on%20Multi-modality%20Awareness%20at%20RAN.docx) Discussion on LS from SA2 on multi-modality awareness at RAN Meta discussion

[R2-2408693](file:///D:\3GPP\Extracts\R2-2408693%20Discussion%20on%20multi-modality%20LS.docx) Discussion on multi-modality LS InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409082](file:///D:\3GPP\Extracts\R2-2409082%20Draft%20Reply%20LS%20on%20multi-modality%20awareness%20at%20RAN.docx) Draft Reply LS on multi-modality awareness at RAN Nokia, Nokia Shanghai Bell LS out NR\_XR\_Ph3-Core To:SA2 Cc:SA4, RAN3

### 8.7.3 RRM measurement gaps/restrictions related enhancements

Objective: Specify enhancements to enable transmission/reception in gaps/restrictions that are caused by RRM measurements (from inter-frequency RRM measurement gaps, or intra-frequency measurements, or other scheduling restrictions etc).

Focus on RAN2 impacts from solutions considered by RAN1/RAN4.

**Impact on L2 features**

[R2-2408347](file:///D:\3GPP\Extracts\R2-2408347.docx) Enabling TX/RX for XR during RRM measurement gaps /restrictions Lenovo discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 4: RAN2 to discuss impacts of a cancellable MG to the DSR procedure, e.g. triggering and cancellation of DSR.

Proposal 5: RAN2 to discuss impacts of a cancellable MG to the measurement event evaluation procedure, e.g. enhance TimeToTrigger due to a cancelled MG occasion.

DISCUSSION on P4:

* LG thinks that DSR enhancements are not in the scope of this objective. LGE thinks it may be quite complex and prefer not to discuss this.
* Apple thinks we have not enough information to evaluate impact on DSR. We should wait for more details with a decision.
* QCM thinks NW can choose threshold wisely and it seems to solve a problem already.
* Ericsson agrees with QCM and it also applies to P5.
* Huawei thinks that in case gap is cancelled there is no issue with DSR.
* Lenovo thinks that too late DSR is not useful, e.g. if gap is cancelled too late. Lenovo assumes that DCI-based solution will be specified and they focus on this solution.
* CATT believes that scenarios in the Tdoc are corner cases and smart gNB can avoid this.
* Nokia would not like to exclude this already.
* ZTE thinks we should only work on this in case something is broken, we do not have to enhance DSR.
* Sharp thinks there may be also impact on, e.g. remaining time calculation/definition. Nokia, Ericsson agrees.
* RAN2 assumes that at least some impact on DSR from MG skipping can be avoided by NW implementation. FFS whether there is an impact which would require some specification changes/enhancements.

DISCUSSION on P5:

* Companies seem to prefer to skip it for now as e.g. it is related to RAN4 discussion.

[R2-2408425](file:///D:\3GPP\Extracts\R2-2408425%20Discussion%20on%20RRM%20measurement%20gaps%20enhancements%20of%20XR%20traffic.doc) Discussion on RRM measurement gaps enhancements of XR traffic Xiaomi Communications discussion

* Noted

Proposal 4 Delay-aware LCP enhancement can be considered when NW indicates skipping gap/restriction occasions.

DISCUSSION on P4:

* CMCC supports this proposal.
* LGE thinks any data can be transmitted in the skipped MG and we don’t need any link with MG skipping. OPPO agrees and clarifies RAN1 agreed that in the skipped gap we use usual transmission.
* QCM thinks that if we design LCP enhancement properly, then we do not have to have any MG skipping enhancements.
* MTK agrees with LGE, OPPO, QCM.
* No need to have delay-aware LCP enhancements specific for MG skipping, i.e. MG skipping and delay-aware LCP are designed as independent features

[R2-2409016](file:///D:\3GPP\Extracts\R2-2409016%20RRM%20Measurement%20Gaps_Restrictions%20related%20Enhancements.docx) RRM measurement gaps/restrictions related enhancements Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 2: interaction of measurement gap skipping and DRX operation should be addressed to ensure DRX and measurement skipping work as intended.

DISCUSSION on P2:

* QCM indicates the proposal is a bit unclear, so not sure what we need to do.
* Nokia clarifies that they would like to ensure that in the skipped gap the UE is active.
* Huawei understand the intention but does not see an issue. The gNB can handle this. Samsung, Apple, QCM agrees.
* Ericsson would like to evaluate this. ZTE thinks when the gap is skipped, then UE monitors according to DRX pattern.
* RAN2 can further evaluate whether there is any impact on DRX from MG skipping. For the moment, the issue is unclear.

**Need of semi-static/UE-initiated solutions**

[R2-2408129](file:///D:\3GPP\Extracts\R2-2408129%20Discussion%20on%20overriding%20measurement%20gaps.docx) Discussion on overriding measurement gaps Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 1. RAN2 discuss the option of using RRC configuration to indicate whether a measurement gap can be overridden by data.

[R2-2408575](file:///D:\3GPP\Extracts\R2-2408575%20Views%20on%20Enhancements%20relating%20to%20Measurement%20Gaps.docx) Views on Enhancements Relating to RRM Measurement Gaps Apple discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 2: RAN2 should also analyze both DCI-based control and RRC-based control for measurement gap skipping, while RAN4 is still evaluating the feasibility of DCI-based control.

DISCUSSION on RRC-based MG skipping solution:

* Ericsson thinks it is up to RAN4 to decide what can be skipped. RAN4 should evaluate the solution first.
* Vivo supports proposal from QCM. From RAN2 point of view we can discuss RRC-based solution. It is complementary.
* ZTE thinks RAN1 has discussed this already and RAN1 and RAN4 should decide. RAN2 should focus on supporting the solution decided by RAN1. Lenovo agrees, we should wait for RAN4 evaluation of DCI solution. Xiaomi, TCL, Fujitsu, IDT agrees, this has been discussed.
* Google supports RRC-based solution, DCI based is not optimal, especially for CG.
* Huawei thinks RRC-based is beneficial for CG. CG is less useful if we just have DCI based skipping.
* CMCC, MTK supports QCM’s proposal for efficiency reasons.
* Samsung indicates that there is also UE-initiated solution which is different.
* RAN2 will focus its work on supporting the solution chosen by RAN1/RAN4
* RAN2 can discuss whether there is a need to additionally have other solution (e.g. RRC-based) which can be decided after RAN1/RAN4 evaluation and knowing more details of DCI-based solution

[R2-2408986](file:///D:\3GPP\Extracts\R2-2408986%20Measurement%20Gap%20Skipping.docx) Discussion on RRM measurement gaps/restrictions enhancements for Rel-19 XR Samsung discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1: RAN2 to consider introducing UE-initiated solution(s) for skipping gaps/restrictions caused by RRM measurements.

Proposal 2: RAN2 to discuss the target case(s) to be addressed by UE-initiated gap/restriction skipping solution(s), considering:

- Case 1: an SR triggered by LCH with delay-critical data is delayed by overlapping gaps/restrictions caused by RRM measurements.

- Case 2: a CG PUSCH transmission multiplexed with DSR is delayed by overlapping gaps/restrictions caused by RRM measurements.

- Case 3: a CG PUSCH transmission multiplexed with delay-critical data is delayed by overlapping gaps/restrictions caused by RRM measurements.

[R2-2408610](file:///D:\3GPP\Extracts\R2-2408610.docx) Discussion on RRM measurement gaps/restrictions related enhancements NEC discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3 RAN2 confirm that it is no need to further discuss solutions for supporting adaptation of MG period considering RAN1 agreed the work assumption to select dynamic indication to enable Tx/Rx in gaps/restrictions that are caused by RRM measurements.

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| **Agreements for RRM measurement gap skipping**   1. RAN2 assumes that at least some impact on DSR from MG skipping can be avoided by NW implementation. FFS whether there is an impact which would require some specification changes/enhancements. 2. No need to have delay-aware LCP enhancements specific for MG skipping, i.e. MG skipping and delay-aware LCP are designed as independent features 3. RAN2 can further evaluate whether there is any impact on DRX from MG skipping. For the moment, the issue is unclear. 4. RAN2 will focus its work on supporting the solution chosen by RAN1/RAN4 5. RAN2 can discuss whether there is a need to additionally have other solution (e.g. RRC-based) which can be decided after RAN1/RAN4 evaluation and knowing more details of DCI-based solution |

[R2-2407998](file:///D:\3GPP\Extracts\R2-2407998%20Enabling%20TX%20RX%20for%20XR%20during%20RRM%20measurements.docx) Enabling TX RX for XR during RRM measurements CATT discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408074](file:///D:\3GPP\Extracts\R2-2408074_Discussion%20on%20RRM%20measurement%20gaps%20enhancements.docx) Discussion on RRM measurement gaps enhancements CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408617](file:///D:\3GPP\Extracts\R2-2408617%20XR%20measurement.docx) Measurement Gap Enhancements for XR Sharp discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408628](file:///D:\3GPP\Extracts\R2-2408628%20Discussion%20on%20RRM%20Measurement%20Gaps_Restrictions%20Enhancements.docx) Discussion on RRM Measurement Gaps/Restrictions Enhancements Meta discussion

[R2-2408689](file:///D:\3GPP\Extracts\R2-2408689%20RRM%20measurement%20gaps_restrictions%20related%20enhancements%20for%20XR.docx) RRM Measurement Gaps/Restrictions related enhancements for XR Google Ireland Limited discussion

[R2-2408720](file:///D:\3GPP\Extracts\R2-2408720_XRMeas_clean.docx) Discussion on enabling TX/RX for XR during RRM measurements Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2408781](file:///D:\3GPP\Extracts\R2-2408781%20Discussion%20on%20RRM%20enhancements%20for%20XR.docx) Discussion on RRM enhancements for XR Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408882](file:///D:\3GPP\Extracts\R2-2408882_XR_RRM_Measurement_GapRestriction_Enhancements.docx) XR - RRM Measurement Gap/Restriction Enhancements Ericsson discussion Rel-19

[R2-2409116](file:///D:\3GPP\Extracts\R2-2409116%20-%20Discussion%20on%20Measurement%20Gap%20enhancements.docx) Discussion on Measurement Gap enhancements OPPO discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409147](file:///D:\3GPP\Extracts\R2-2409147%20XR%20RRM%20measurement%20gaps.docx) Discussion on XR RRM measurement gaps/restrictions related enhancements III discussion NR\_XR\_Ph3-Core

[R2-2409151](file:///D:\3GPP\Extracts\R2-2409151%20Discussion%20on%20MG%20enhancement%20for%20XR.docx) Discussion on MG enhancement for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

### 8.7.4 Scheduling enhancements

#### 8.7.4.1 LCP enhancements

Objective: Specify Enhancements for support of UL scheduling to enable high XR capacity while meeting delay requirements/avoiding too late PDUs, as follows [RAN2]:

* Specify additional Logical Channel priority handling using delay/deadline information of packets;

Including aspects such as further details of the additional priority for LCH with dealy-critical data

**How/when to apply additional priority**

[R2-2409155](file:///D:\3GPP\Extracts\R2-2409155%20LCP%20Enhancements%20v3.docx) LCP enhancements for Rel-19 XR Samsung R&D Institute UK discussion

* Noted

Proposal 2. The additional LCH priority is applied to the entire data of a LCH with both delay-critical and non-delay-critical data.

Proposal 3. RAN2 to discuss on the preferred option between:

- Option 1: additional LCH priority is applied for an LCH in both 1st and 2nd Rounds of resource allocation procedure in LCP, as long as the LCH has delay-critical data available for transmission when starting the 1st Round.

- Option 2: additional LCH priority is applied for an LCH in 1st Round of resource allocation procedure in LCP, if the LCH has delay-critical data available for transmission when starting the 1st Round, and the additional LCH priority is applied for an LCH in 2nd Round of resource allocation procedure in LCP, if the LCH has residual delay-critical data available for transmission when starting 2nd Round.

DISCUSSION on P2:

* CMCC thinks we need to prioritize delay-critical data.
* QCM thinks this proposal causes fairness issues.

DISCUSSION on P3:

* Vivo, MTK, OPPO, LGE prefers O1 for simplicity issues of PDU construction.
* Lenovo thinks O1 is easier but there is fairness issues. Changing priority for the 2nd round is not very complicated.
* OPPO indicates that with O2 UE will have to check what resources were allocated after each 1st round which delays the PDU construction.
* Apple is concerned about the PDU construction timeline, so checking what happens at PDCP layer is very complex with tight processing timeline.
* TCL agrees with O1, but we need to consider SRB.
* Fujitsu think O2 is not complex. In 2nd round we just do the same priority check as in the first round.
* LGE thinks fairness issue can be avoided with proper configuration.
* QCM thinks UE can fallback to lower priority at any time, regardless of the round.
* Huawei prefers O2. It impacts fairness if we continue using higher priority when there is no delay critical data. UE knows in advance the buffer status when it starts the LCP procedure. Ericsson agrees, the UE does not check with PDCP again.
* Apple is still concerned that PDCP indication comes on time.
* Nokia is OK with both O1 and O2.
* CATT thinks we need to solve fairness issue, so prefer O2.
* Xiaomi is OK with O2 to solve fairness issue.
* Spreadtrum is concerned about LCP procedure delay.
* Sharp think with proper PBR configuration, second round will not have delay critical data anyway.
* Ericsson encourages companies to look at their TP, it is not complex.
* Apple thinks it can also be left to UE implementation.
* As a baseline, additional LCH priority is applied for an LCH in both 1st and 2nd Rounds of resource allocation procedure in LCP, as long as the LCH has delay-critical data available for transmission when starting the 1st Round.
* FFS if we can still change the priority for the 2nd round to ensure fairness, but we need to consider tight timeline of LCP procedure and UE complexity. Companies can also check whether we can leave this to UE implementation

**Remaining time threshold**

[R2-2408106](file:///D:\3GPP\Extracts\R2-2408106%20Discussion%20on%20additional%20Logical%20Channel%20priority%20handling.docx) Discussion on additional Logical Channel priority handling TCL discussion

* Noted

Proposal 2: The triggering condition of delay-critical priority for each LCH may be different, it is suggested to introduce an independent remaining time threshold for delay-critical priority.

DISCUSSION:

* LGE thinks that with new threshold we need to define a new delay critical data concept. Hence DSR threshold can be reused.
* Apple asks if the threshold is checked at PDCP on MAC layer?
* Ericsson thinks this data is different than the one in DSR. E.g. network may want to trigger DSR early, but not prioritize data that early. These should be separate thresholds.
* Samsung, Nokia thinks we can reuse a concept of delay critical data, but still trigger at different times.
* Xiaomi thinks priority boosting should be linked with sending DSR.
* Lenovo, Interdigital agrees with Ericsson. For sending DSR we may first need to obtain resources. These are two different things.
* Xiaomi asks if we need to combine with DSR. CMCC thinks these are different, data can be requested with BSR.
* Introduce an independent per-LCH remaining time threshold for applying delay-critical priority.
* We do not introduce any setting restrictions of this new remaining time threshold with relation to DSR triggering threshold.

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| **Agreements on LCP enhancements**   1. As a baseline, additional LCH priority is applied for an LCH in both 1st and 2nd Rounds of resource allocation procedure in LCP, as long as the LCH has delay-critical data available for transmission when starting the 1st Round. 2. FFS if we can still change the priority for the 2nd round to ensure fairness, but we need to consider tight timeline of LCP procedure and UE complexity. Companies can also check whether we can leave this to UE implementation 3. Introduce an independent per-LCH remaining time threshold for applying delay-critical priority. 4. We do not introduce any setting restrictions of this new remaining time threshold with relation to DSR triggering threshold. |

DISCUSSION on terminology used for data with adjusted priority:

* QCM suggests a term for data below the new threshold used for priority boosting: “urgent data”
* Ericsson proposes “priority-adjusted data”
* For now, we will use “LCH priority-adjusted data”

[R2-2408650](file:///D:\3GPP\Extracts\R2-2408650.docx) Discussion on LCP enhancements for XR DENSO CORPORATION discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3: There is no need to introduce a separate remaining time threshold for delay-aware LCP. The remaining time threshold configured for R18 DSR can be reused for triggering LCH priority adjustments.

**Other impacts on MAC**

[R2-2408121](file:///D:\3GPP\Extracts\R2-2408121_Discussion%20on%20LCP%20enhancement%20for%20XR.docx) Discussion on LCP enhancement for XR vivo discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3 In addition to LCH priority adaptation, RAN2 should also consider the option to allow UE to temporarily raise the rate limit (e.g. Bj) of the LCH with delay-critical data.

Proposal 5 No enhancement is needed for intra-UE prioritization procedure due to the additional LCH priority.

[R2-2409149](file:///D:\3GPP\Extracts\R2-2409149%20Discussion%20on%20LCP%20enhancement%20for%20XR.docx) Discussion on LCP enhancement for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3. For adjustment of LCP of LCH with delay-critical data, the PBR should be set to infinity.

Proposal 6. The additional priority for LCH with delay critical data should also be applied on intra-UE prioritization.

**Configuration details**

[R2-2408421](file:///D:\3GPP\Extracts\R2-2408421%20XR%20Additional%20Priority.docx) Additional LCH Priority Handling and Prioritization Sharp discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1 Additional LCH priority is configured by logicalChannelConfig in an RRC message.

Proposal 2 At most one additional LCH priority can be configured for each logical channel.

[R2-2408916](file:///D:\3GPP\Extracts\R2-2408916%20-%20LCP%20enhancements.docx) LCP enhancements Ericsson discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 5 For each LCH that contains time critical data, it shall be possible to configure via RRC an alternative priority value and a remaining time threshold in the IE LogicalChannelConfig.

Proposal 6 How to configure priority values so that e.g. pose and signalling always have higher priority than time critical data can be left for network implementation.

[R2-2407999](file:///D:\3GPP\Extracts\R2-2407999%20Consideration%20on%20LCP%20enhancement.docx) Consideration on LCP enhancement CATT discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408094](file:///D:\3GPP\Extracts\R2-2408094%20Consideration%20on%20LCP%20Enhancement%20for%20XR.docx) Consideration on LCP enhancement for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408130](file:///D:\3GPP\Extracts\R2-2408130%20Discussion%20on%20LCP%20enhancements.docx) Discussion on LCP enhancements Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408134](file:///D:\3GPP\Extracts\R2-2408134%20-%20Discussion%20on%20delay-aware%20LCP%20enhancements%20for%20XR.docx) Discussion on delay-aware LCP enhancements for XR OPPO discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408152](file:///D:\3GPP\Extracts\R2-2408152_xr_lcp.doc) Discussions on enhancement of the LCP for delay-critical data Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core R2-2406548

[R2-2408177](file:///D:\3GPP\Extracts\R2-2408177.doc) Discussion on LCP enhancements for XR Spreadtrum Communications discussion Rel-19

[R2-2408286](file:///D:\3GPP\Extracts\R2-2408286%20Discussion%20on%20LCP%20enhancements.docx) Discussion on LCP enhancements HONOR discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408343](file:///D:\3GPP\Extracts\R2-2408343_Considerations%20on%20LCP%20enhancements.docx) Considerations on LCP enhancements for XR NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408346](file:///D:\3GPP\Extracts\R2-2408346.docx) Enhanced Logical channel prioritization (LCP) for XR Lenovo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408426](file:///D:\3GPP\Extracts\R2-2408426%20Discussion%20on%20LCP%20enhancements%20of%20XR%20traffic.doc) Discussion on LCP enhancements of XR traffic Xiaomi Communications discussion

[R2-2408495](file:///D:\3GPP\Extracts\R2-2408495%20Discussion%20on%20logical%20channel%20priority.docx) Discussion on Logical channel priority CANON Research Centre France discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408530](file:///D:\3GPP\Extracts\R2-2408530_xrLcpEnh-v00.docx) LCP enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2408576](file:///D:\3GPP\Extracts\R2-2408576%20Delay-based%20Logical%20Channel%20Priority%20Adjustment.docx) Delay-based Logical Channel Priority Adjustment Apple discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408694](file:///D:\3GPP\Extracts\R2-2408694%20LCP%20enhancements%20for%20UL%20scheduling.docx) LCP enhancements for UL scheduling InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408727](file:///D:\3GPP\Extracts\R2-2408727%20LCP%20enhancements.docx) Discussion on additional priority based LCP enhancements in XR Huawei, HiSilicon discussion NR\_XR\_Ph3-Core

[R2-2408857](file:///D:\3GPP\Extracts\R2-2408857%20Discussion%20on%20Leftover%20Issues%20for%20LCP%20Prioritization.docx) Discussion on Leftover Issues for LCP Prioritization China Telecom discussion

[R2-2408907](file:///D:\3GPP\Extracts\R2-2408907_Discussion%20on%20additional%20LCP%20handling_v1003.docx) Discussion on additional LCP handling ETRI discussion Rel-19

[R2-2409017](file:///D:\3GPP\Extracts\R2-2409017%20LCP%20Enhancements.docx) LCP Enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409049](file:///D:\3GPP\Extracts\R2-2409049%20LCP%20enhancements%20for%20LCH%20with%20delay%20critical%20data.docx) LCP enhancements for LCH with delay critical data MediaTek Inc. discussion Rel-19 NR\_XR\_Ph3-Core

#### 8.7.4.2 DSR enhancements

Objective: Specify enhanced DSR (Delay Status Report) reporting with multiple pairs of remaining time and buffer size for a LCG.

Including aspects such as further details of DSR with multiple pairs of remaining time and buffer size, e.g. does PSI need to be included, need of thresholds configuration constraints, impact on delay-critical data definition, inclusion of non-delay critical data etc.

**Thresholds configuration**

[R2-2408135](file:///D:\3GPP\Extracts\R2-2408135%20-%20Discussion%20on%20delay-aware%20DSR%20enhancements%20for%20XR.docx) Discussion on delay-aware DSR enhancements for XR OPPO discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Observation 1 Flexible configuration of DSR triggering and reporting thresholds allows NW to obtain finer delay status information it would like to know, including both delay critical data (i.e., the data that has already been delay-critical) and non-delay critical data (i.e., the data that is going to be delay-critical).

Proposal 1 No need to restrict how NW configures DSR triggering and reporting thresholds.

Proposal 2 Delay critical data is still defined based on the single DSR trigger threshold, regardless of the setting of multiple reporting thresholds.

[R2-2408695](file:///D:\3GPP\Extracts\R2-2408695%20DSR%20enhancements%20for%20UL%20scheduling.docx) DSR enhancements for UL scheduling InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 2: Specify a requirement that the NW sets the DSR triggering threshold (ie., remainingTimeThreshold) as the largest time threshold among the multiple remaining time thresholds configured.

DISCUSSION on threshold setting:

* Ericsson agrees there is no need for limiting the configuration, but everything in DSR should be delay critical data.
* LGE supports both proposals from OPPO, including the one on delay-critical data.
* Vivo agrees threshold configuration should be up to NW implementation.
* Xiaomi, Fujitsu, Spreadtrum, QCM supports the proposal from IDT as DSR is for delay-critical data only.
* TCL thinks triggering threshold can be any of the configured thresholds.
* Nokia thinks procedure-wise there is no difference, but there is no ned to restrict.
* Apple thinks that threshold setting depends on scheduler implementation, so it should be flexible.
* CMCC thinks this should depend on network, it depends on network requirement.
* Huawei thinks that we still rely on triggering threshold for delay-critical data, but we add some additional information.
* Huawei, Samsung supports OPPO’s proposal.
* QCM, MTK is afraid about the impact on specifications in case we report non-DC data in DSR, e.g. DSR cancellation.
* Xiaomi is afraid we may need to discuss a lot of issues if we include non-delay critical data in DSR.
* Ericsson thinks that in case companies assume that the same data cannot be included in DSR multiple times, then we will have Rel-18 DSR behaviour, i.e. lower thresholds will always be empty.
* Nokia thinks that in case there is a new trigger for the DSR, then this new DSR will also include previously reported data (if still in the buffer).
* We do not change the definition of delay-critical data
* For the sake of RAN2 discussions, we use the following terms: triggering threshold, reporting threshold(s)
* Companies should analyse the impact of setting the triggering threshold to value lower than largest reporting threshold on DSR procedure, e.g. triggering, cancellation etc.

**Non-delay critical data handling**

[R2-2408728](file:///D:\3GPP\Extracts\R2-2408728%20DSR%20enhancements.docx) Discussion on DSR enhancements in XR Huawei, HiSilicon discussion NR\_XR\_Ph3-Core

Proposal 4: The non-delay-critical data information which has impact on delay-critical data transmission (i.e. in front of the transmission queue) should also be included for each LCG and this includes:

• Non-delay-critical data information from other LCHs with LCH priority higher than that of the LCH which triggers the DSR;

• When PSI-based discard is activated, the data volume of the low importance PDU sets which is ahead of delay-critical data in the UE buffer.

[R2-2408153](file:///D:\3GPP\Extracts\R2-2408153%20Discussions%20on%20DSR%20enhancements.docx) Discussions on DSR enhancements Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3: Non-delay critical data ahead of delay-critical data is not included in the buffer size calculation for DSR.

**DSR MAC CE details**

[R2-2408577](file:///D:\3GPP\Extracts\R2-2408577%20Views%20on%20DSR%20Enhancements.docx) Views on DSR Enhancements Apple discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 1: For Rel-19 DSR, the buffered data is divided into multiple portions based on the multiple remaining time threshold levels configured for an LCG. The Rel-19 DSR indicates the following information:

• Buffer size of data volume in each portion

• Shortest remaining time among PDCP SDUs buffered in each portion.

Proposal 5: There is no need to include importance information in the DSR MAC CE.

Proposal 7: For an LCG configured with multiple remaining time thresholds, the UE should be conditionally allowed to only report delay information (i.e. remaining time and buffer size) corresponding to a subset of remaining time thresholds configured for the LCG.

DISCUSSION on P1:

* QCM supports this proposal. Data should only be reported if BS is >0. LGE agrees.
* For Rel-19 DSR, the buffered data is divided into multiple portions based on the multiple reporting time threshold levels configured for an LCG. The Rel-19 DSR indicates the following information for each portion for which BS>0:

• Buffer size of data volume in each portion

• Shortest remaining time among PDCP SDUs buffered in each portion.

DISCUSSION on P5:

* Nokia would like to clarify this is about PSI.
* CMCC, Xiaomi would like to clarify we will not include low PSI data in DSR.
* There is no need to include PSI in the enhanced DSR MAC CE.

[R2-2408307](file:///D:\3GPP\Extracts\R2-2408307%20uplink%20scheduling-DSR.docx) Enhanced delay status reporting for XR Lenovo discussion Rel-19

* Noted

Proposal 4: If at least one LCG configured with report thresholds triggered DSR, UE should use new DSR format for all LCGs. A one-bit field (Extension flag) may indicate whether some further pair of remaining time information and buffer size information is present in the new DSR MAC CE for the associated LCG.

DISCUSSION:

* QCM is fine with the proposal in principle, but there should be additional condition that DSR fits the grant.
* OPPO agrees with thre first part of the proposal, but thinks that we may need more bits to indicate the presence of the information.
* Xiaomi supports the proposal and one bit is enough.
* LGE supports the proposal.
* Nokia thinks that whether we use old or new DSR should depend on buffer status, not configuration. Samsung agrees.
* ZTE is not sure about fallback to old DSR.
* Apple thinks that some LCGs may have one reporting threshold and some may have multiple thresholds, so we need to consider how old and new DSR interoperate.
* Interdigital, ZTE think there are cases where we should always use new DSR, because we can omit portions which have no data.
* Ericsson asks what the problem is always using new DSR.
* A one-bit indication may indicate whether a certain/further pair of remaining time information and buffer size information is present in the new DSR MAC CE for the associated LCG.
* FFS whether old and new DSR can be configured/used at the same time or we always use a new DSR in case there is at least one LCG configured with multiple reporting thresholds

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| **Agreements on DSR enhancements**   1. We do not change the definition of delay-critical data 2. For the sake of RAN2 discussions, we use the following terms: triggering threshold, reporting threshold(s) 3. Companies should analyse the impact of setting the triggering threshold to value lower than largest reporting threshold on DSR procedure, e.g. triggering, cancellation etc. 4. For Rel-19 DSR, the buffered data is divided into multiple portions based on the multiple reporting time threshold levels configured for an LCG. The Rel-19 DSR indicates the following information for each portion for which BS>0:    * Buffer size of data volume in each portion    * Shortest remaining time among PDCP SDUs buffered in each portion. 5. There is no need to include PSI in the enhanced DSR MAC CE. 6. A one-bit indication may indicate whether a certain/further pair of remaining time information and buffer size information is present in the new DSR MAC CE for the associated LCG. 7. FFS whether old and new DSR can be configured/used at the same time or we always use a new DSR in case there is at least one LCG configured with multiple reporting thresholds |

[R2-2408000](file:///D:\3GPP\Extracts\R2-2408000%20Consideration%20on%20DSR%20enhancement.docx) Consideration on DSR enhancement CATT discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408095](file:///D:\3GPP\Extracts\R2-2408095%20Consideration%20on%20DSR%20Enhancement%20for%20XR.docx) Consideration on DSR enhancement for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408122](file:///D:\3GPP\Extracts\R2-2408122_Discussion%20on%20DSR%20enhancement%20for%20XR.docx) Discussion on DSR enhancement for XR vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408131](file:///D:\3GPP\Extracts\R2-2408131%20Discussion%20on%20DSR%20enhancements.docx) Discussion on DSR enhancements Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408288](file:///D:\3GPP\Extracts\R2-2408288%20Discussion%20on%20DSR%20enhancements.docx) Discussion on DSR enhancements HONOR discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408344](file:///D:\3GPP\Extracts\R2-2408344_Considerations%20on%20DSR%20enhancements.docx) Considerations on DSR enhancements for XR NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408422](file:///D:\3GPP\Extracts\R2-2408422%20XR%20DSR.docx) Considerations for DSR Enhancements Sharp discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408427](file:///D:\3GPP\Extracts\R2-2408427%20Discussion%20on%20DSR%20enhancements%20of%20XR%20traffic.doc) Discussion on DSR enhancements of XR traffic Xiaomi Communications discussion

[R2-2408496](file:///D:\3GPP\Extracts\R2-2408496%20Discussion%20on%20delay%20status%20report.docx) Discussion on Delay status report CANON Research Centre France discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408531](file:///D:\3GPP\Extracts\R2-2408531_xrDsrEnh-v00.docx) DSR enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2408629](file:///D:\3GPP\Extracts\R2-2408629%20Discussion%20on%20DSR%20Enhancements.docx) Discussion on DSR Enhancements Meta discussion

[R2-2408683](file:///D:\3GPP\Extracts\R2-2408683%20Discussion%20on%20enhanced%20DSR%20for%20XR.docx) Discussion on enhanced DSR for XR ITRI discussion NR\_XR\_Ph3-Core

[R2-2408858](file:///D:\3GPP\Extracts\R2-2408858%20Discussion%20on%20Remaining%20Issues%20for%20DSR%20Enhancement.docx) Discussion on Remaining Issues for DSR Enhancement China Telecom discussion

[R2-2408918](file:///D:\3GPP\Extracts\R2-2408918%20-%20DSR%20enhancements.docx) DSR enhancements Ericsson discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408985](file:///D:\3GPP\Extracts\R2-2408985%20DSR%20Enhancements.docx) DSR enhancements for Rel-19 XR Samsung discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409018](file:///D:\3GPP\Extracts\R2-2409018%20DSR%20Enhancements.docx) DSR Enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409074](file:///D:\3GPP\Extracts\R2-2409074-Discussion%20on%20DSR%20enhancement.docx) Discussion on DSR enhancement TCL discussion Rel-19

[R2-2409101](file:///D:\3GPP\Extracts\R2-2409101_Discussion%20on%20DSR%20enhancements_v1003.docx) Discussion on DSR enhancements ETRI discussion

[R2-2409112](file:///D:\3GPP\Extracts\R2-2409112%20Remaining%20issues%20for%20DSR%20enhancement.docx) Remaining issues for DSR enhancement MediaTek Inc. discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409145](file:///D:\3GPP\TSGR2\TSGR2_127bis\Docs\R2-2409145.zip) Discussion on XR scheduling enhancements III discussion NR\_XR\_Ph3-Core

[R2-2409150](file:///D:\3GPP\Extracts\R2-2409150%20Discussion%20on%20DSR%20enhancement%20for%20XR.docx) Discussion on DSR enhancement for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

### 8.7.5 RLC enhancements

Objective: RLC re-transmission related enhancements for operation of RLC Acknowledged Mode (AM) with small packet delay budget.

Including aspects such as:

* how to avoid unnecessary retransmissions, e.g. details of Tx, Rx and combined approaches, pros and cons comparison.
* how to ensure timely RLC retransmissions for XR, e.g.
  + can existing mechanisms be reused or do we need enhancements?
  + what kind of enhancements are needed, e.g. autonomous retransmission, retransmission based on enhanced status report, retransmission based on enhanced polling.
  + details and pros and cons of different solutions.

**Timely retransmissions**

[R2-2408982](file:///D:\3GPP\Extracts\R2-2408982%20Discussion%20on%20further%20details%20of%20RLC%20enhancements%20for%20XR.docx) Discussion on further details of RLC enhancements for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 5. RAN2 confirm that existing mechanisms with smaller timer values are insufficient to resolve the timely RLC retransmission problem and RLC enhancements for timely RLC retransmission are investigated in Rel-19.

Proposal 6. The transmitting entity include a poll when the RLC SDU having remaining time lower than a threshold is submitted to the lower layer for transmission.

Proposal 7. A new indication is included in the STATUS report to make the transmitting entity retransmit all RLC SDUs having remaining time lower than the threshold and not yet indicated by ACK.

Proposal 8. If remaining time of a RLC SDU in the transmitting window becomes below a threshold, this RLC SDU should be considered for retransmission without receiving NACK for this RLC SDU.

Proposal 10. RLC retransmission based on HARQ NACK is not supported.

DISCUSSION on P5:

* Apple, vivo thinks that shorter polling timer solves a lot of issues. Autonomous retransmissions cause some issue as gNB may not be aware of data pending at the UE.
* LGE thinks that the problem is that existing SR is not reliable enough.
* Nokia agrees with the proposal from LGE. We need to avoid additional overhead.
* QCM, LGE think that with current mechanisms we introduce too much overhead.
* RAN2 confirm that existing mechanisms are insufficient to resolve the timely RLC retransmission problem and RLC enhancements for timely RLC retransmission are investigated in Rel-19.

[R2-2408132](file:///D:\3GPP\Extracts\R2-2408132%20Discussion%20on%20RLC%20enhancements.docx) Discussion on RLC enhancements Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 1. Deprioritize options for enhanced polling and enhanced status reporting.

Proposal 2. Focus the discussion on autonomous retransmission, e.g. the following options:

- after the remaining time of a PDU has dropped below a configured threshold; or

- after a PDU has failed a configured number of HARQ transmissions; or

- if a PDU is in the RLC retransmission buffer and there are spare PUSCH resources available after the LCP procedure.

DISCUSSION on P1-P2:

* Sharp thinks that SR and polling can be lost so autonomous reTx is safest approach.
* MTK thinks we should deprioritize autonomous reTx because there may be capacity loss. MTK prefers enhancing SR.
* Ericsson also has concerns with autonomous reTx. It is hard to set the threshold so that it is not too early. Ericsson thinks polling enhancements make more sense.
* Sony thinks there is overhead from autonomous reTx. Sony prefers to enhance SR reporting.
* Xiaomi agrees with MTK and Sony. Enhancing SR ahs little impact on overall capacity.
* Huawei thinks that polling and SR can already be properly configured. We should focus on autonomous reTx. We can have further discussion how to limit impact on capacity.
* Samsung does not like autonomous.
* ZTE thinks that for DL is up to gNB.
* ZTE think for UL we can exclude autonomous reTx.

Show of hands (to support, multiple choice):

* Polling enhancements: 11
* Status report enhancements: 11
* Autonomous retransmissions: 13

Show of hands (to support, single choice):

* Polling enhancements: 9
* Status report enhancements: 6
* Autonomous retransmissions: 11
* Exclude enhanced status reporting.
* Focus the discussion on autonomous retransmission and polling enhancements, e.g. we need to understand how each option affects the capacity and packet delay

[R2-2408001](file:///D:\3GPP\Extracts\R2-2408001%20Consideration%20on%20XR-specific%20RLC%20enhancement.docx) Consideration on XR-specific RLC enhancement CATT discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1: Not to support the RLC autonomous retransmission for R19 XR.

Proposal 2: Enhanced status report for UL data transmission can be left to gNB implementation, no spec impact.

Proposal 3: Enhanced Polling could be used for RLC timely retransmission, the below two options could be used for down-selection:

⁻ Option 1: the network can configure a new set of shorter value for pollPDU and pollByte to trigger the polling for timely RLC retransmission.

⁻ Option 2: the UE can use the delay criticality of the AMD PDU to trigger the polling for timely RLC retransmission.

**Avoiding unnecessary retransmissions**

[R2-2409208](file:///D:\3GPP\Extracts\R2-2409208%20-%20Discussion%20on%20RLC%20re-transmission%20related%20enhancements.docx) Discussion on RLC re-transmission related enhancements OPPO, China Telecom, Sharp, Samsung, HONOR, CMCC, KDDI, Apple, Intel, vivo, MediaTek, ZTE, Canon discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Observation 1 For Tx initiated approach, since Tx side has full knowledge of PDU type, the inter-PDU dependency unnecessary retransmission can be decided accurately.

Observation 2 In other words, timer-based Rx initiated approach and combined approach, it may mistakenly discard PDCP control PDUs or PDUs that have dependencies with other received PDUs.

Observation 3 For timer-based Rx initiated approach and combined approach, there would be either packet loss due to too-short timer length or unnecessary retransmission due to too-long timer length, which cannot be solved by network implementation of timer length setting.

Observation 4 Tx initiated approach can fully avoid unnecessary retransmission of obsolete PDUs, whereas unnecessary retransmission cannot be fully avoided by Rx initiated approach due to the delay of indication from Rx to Tx side.

Observation 5 For the Rx-timer, the detailed solution is not clear: 1) the selection of timer granularity may cause either additional latency or mis-discard, and 2) the selection of timer start condition may cause either mis-discard or make the new Rx timer useless.

Observation 6 The sync of windows at Tx side and Rx side can be secured in Tx initiated approach.

Proposal 1 For avoiding unnecessary RLC AM retransmissions, RAN2 to adopt the Tx initiated approach.

[R2-2408154](file:///D:\3GPP\Extracts\R2-2408154%20Discussions%20on%20RLC%20enhancements.docx) Discussions on RLC enhancements Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Observation 3: In the Rx initiated approach, the timer in the Rx side can be configured by the network.

Observation 4: In the Tx initiated approach, the Tx side can advance the Tx window first e.g. upon transmitting the RLC SDU gap report to the Rx side.

Observation 5: In the combined Rx and Tx approach, signalling overhead is saved, but it is unclear how to ensure window sync between the Tx side and the Rx side.

Proposal 5: Rx initiated approach is adopted for avoiding unnecessary retransmissions.

[R2-2408646](file:///D:\3GPP\Extracts\R2-2408646%20XR%20RLC%20Enhancements.docx) RLC enhancements Nokia discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 1: RAN2 confirm the previous baseline assumption: the RLC receiving window always advances to any given RLC SN before the transmitting window does.

Proposal 2: RAN2 adopt the newly identified “combined Rx and Tx approach” (TX side stops transmissions of an outdated SDU, RX side abandons the SDU based on a local timer).

Proposal 3: No discard indication from RLC transmitter to receiver is introduced.

Proposal 4: For indicating abandoned RLC SDUs from RLC receiver to transmitter, in order that the transmitting PDCP reliably knows the items 1-3 listed in Observation 3, RAN2 select between:

A) RLC ACK, combined with regular PDCP status reporting to keep the PDCP transmitter reliably informed of successful delivery; or

B) A new explicit RLC indication separate from ACK, of SDUs abandoned by the receiver.

DISCUSSION on Rx vs Tx vs combined:

* Nokia asks about safety mechanism for Tx solution as Tx indication can be lost. It cannot be used as a baseline mechanism. Window at Tx cannot move before Rx window moves.
* OPPO think Tx indication lost case is not typical case, but there are solutions. It would be OK to move Rx window before Tx window.
* LGE agrees a principle that Rx advances first is very important to avoid error cases causing HSFN desync. Another reason why Tx is not good is because it duplicates PDCP mechanism and it has a lot of impacts on specs.
* Ericsson thinks a combined approach makes a lot of sense. For Tx we can eventually get a lot of corner cases causing issues.
* Lenovo agrees with P1 from Nokia. Combined approach could work, but some indication from Tx to Rx could still be used.
* Xiaomi agrees combined approach is a good way forward. It is much simpler than Tx and achieves the goal.
* Mediatek agrees with Lenovo and Xiaomi. We should down-select between Tx and combined.
* QCM also underlines importance of window advancing rules. Tx approach requires a lot of additional implementation work due to new C-PDU. QCM prefers combined approach.
* Vivo wonders if everybody thinks of the same combined approach.
* Spreadtrum still thinks for Tx approach we need some indication from Tx to Rx.
* Futurewei supports combined approach. Asks if we speak of lower bound or upper of window when we speak of advancing.
* Huawei thinks that existing status report can be used as indicaitoon from Rx to Tx.
* Nokia does not think we can reuse existing SR. Tx side needs to be aware whether this was real ACK or not.
* Ericsson thinks existing SR can be used as a baseline.
* Sharp thinks that even in combined approach some indication from Tx to Rx may be needed
* Huawei thinks that for combined approach the important thing was to save signalling overhead
* OPPO, vivo have some concerns about the delay if we do not have any indication from Rx to Tx.
* LGE does not think we need any indication from Tx, the delay in advancing window will not be much, i.e. as in the legacy operation. Nokia, Lenovo agrees.
* OPPO thinks that some C-PDUs can be discarded.
* CMCC, Samsung think some indication from Tx to Rx is still needed.
* LGE clarifies there is no C-PDU discard issue.
* RAN2 confirm the previous baseline assumption: the RLC receiving window always advances to any given RLC SN before the transmitting window does.
* RAN2 will adopt a “combined” approach for avoiding unnecessary RLC retransmissions, i.e.
* TX side stops transmissions of an outdated SDU
* RX side abandons the SDU based on a local timer
* **Rx informs Tx side about the abandoned SDUs, as a baseline we assume existing SR can be reused unless issues are identified**
* **FFS if some C-PDU handling is needed to avoid C-PDU discard**
* **FFS if some indication is sent from Tx to Rx. The assumption is this is not a full status report, but something simple (if needed)**

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| **Agreements on RLC timely retransmissions**   1. RAN2 confirm that existing mechanisms are insufficient to resolve the timely RLC retransmission problem and RLC enhancements for timely RLC retransmission are investigated in Rel-19. 2. Exclude enhanced status reporting. 3. Focus the discussion on autonomous retransmission and polling enhancements, e.g. we need to understand how each option affects the capacity and packet delay   **Agreements on avoiding unnecessary retransmissions**   1. RAN2 confirm the previous baseline assumption: the RLC receiving window always advances to any given RLC SN before the transmitting window does. 2. RAN2 will adopt a “combined” approach for avoiding unnecessary RLC retransmissions, i.e.  * TX side stops transmissions of an outdated SDU * RX side abandons the SDU based on a local timer * Rx informs Tx side about the abandoned SDUs, as a baseline we assume existing SR can be reused unless issues are identified * FFS if some C-PDU handling is needed to avoid C-PDU discard * FFS if some indication is sent from Tx to Rx. The assumption is this is not a full status report, but something simple (if needed) |

[R2-2407986](file:///D:\3GPP\TSGR2\TSGR2_127bis\Docs\R2-2407986%20.zip) Discussion on RLC AM enhancements Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408033](file:///D:\3GPP\Extracts\R2-2408033.docx) RLC AM retransmission enhancements Xiaomi discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408075](file:///D:\3GPP\Extracts\R2-2408075.docx) Discussion on the RLC re-transmission related enhancements for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408123](file:///D:\3GPP\Extracts\R2-2408123_Discussion%20on%20RLC%20enhancement%20for%20XR.docx) Discussion on RLC enhancement for XR vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408178](file:///D:\3GPP\Extracts\R2-2408178.doc) Discussion on timely RLC retransmission(s) Spreadtrum Communications discussion Rel-19

[R2-2408287](file:///D:\3GPP\Extracts\R2-2408287%20Discussion%20on%20timely%20RLC%20enhancements.docx) Discussion on timely RLC enhancements HONOR discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408308](file:///D:\3GPP\Extracts\R2-2408308%20AM%20RLC%20enhancement.docx) AM RLC enhancement Lenovo discussion Rel-19

[R2-2408424](file:///D:\3GPP\Extracts\R2-2408424%20XR%20Timely%20Retransmission.docx) Discussion on Timely Retransmission Sharp discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408497](file:///D:\3GPP\Extracts\R2-2408497%20%20Discussion%20on%20RLC%20AM%20Enhancements.docx) Discussion on RLC AM Enhancements CANON Research Centre France discussion Rel-19 NR\_XR\_Ph3

[R2-2408532](file:///D:\3GPP\Extracts\R2-2408532%20xrRlcEnh-v00.docx) RLC enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2408578](file:///D:\3GPP\Extracts\R2-2408578%20Views%20on%20RLC-AM%20Enhancements%20for%20Rel-19%20XR.docx) Views on RLC-AM Enhancements for Rel-19 XR Apple discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408630](file:///D:\3GPP\Extracts\R2-2408630%20Discussion%20on%20RLC%20AM%20Enhancements%20for%20XR.docx) Discussion on RLC AM Enhancements for XR Meta discussion

[R2-2408633](file:///D:\3GPP\Extracts\R2-2408633%20RLC%20Enhancements%20for%20XR.docx) RLC Enhancements for XR Samsung discussion Rel-19

[R2-2408673](file:///D:\3GPP\Extracts\R2-2408673.docx) Further Discussion on RLC AM enhancement NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408696](file:///D:\3GPP\Extracts\R2-2408696%20(R19%20NR%20XR%20A875_RLC_retransmission%20enhancement).docx) Discussion on RLC retransmission enhancements InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408697](file:///D:\3GPP\Extracts\R2-2408697%20(R19%20NR%20XR%20A875_RLC_Avoid%20unnecessary%20retransmission).docx) Avoiding unnecessary RLC re-transmissions InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408715](file:///D:\3GPP\Extracts\R2-2408715_XR_RLC_v3.docx) RLC AM enhancements Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2408859](file:///D:\3GPP\Extracts\R2-2408859%20Discussion%20on%20RLC%20Enhancement.docx) Discussion on RLC Enhancement China Telecom discussion

[R2-2408883](file:///D:\3GPP\Extracts\R2-2408883_Even%20Further%20Discussions%20on%20RLC%20AM%20Enhancements.docx) Even Further Discussions on RLC AM Enhancements Ericsson discussion Rel-19

[R2-2409073](file:///D:\3GPP\Extracts\R2-2409073-Discussion%20on%20RLC%20AM%20enhancement.docx) Discussion on RLC AM enhancement TCL discussion Rel-19

[R2-2409115](file:///D:\3GPP\Extracts\R2-2409115%20-%20Discussion%20on%20RLC%20re-transmission%20related%20enhancements.docx) Discussion on RLC re-transmission related enhancements OPPO, China Telecom, Sharp, Samsung, HONOR, CMCC, KDDI, Apple, Intel, vivo, MediaTek, ZTE discussion Rel-19 NR\_XR\_Ph3-Core

=> Revised in R2-2409208

[R2-2409153](file:///D:\3GPP\Extracts\R2-2409153%20RLC%20AM%20enhancements%20with%20small%20packet%20delay%20budget.docx) RLC AM enhancements with small packet delay budget MediaTek Inc. discussion Rel-19 38.322 NR\_XR\_Ph3-Core

### 8.7.6 XR rate control

Objective: Specify uplink congestion signaling [RAN2]:

* Specify in MAC layer XR rate control signaling over downlink per QoS flow/per DRB to enable faster source rate adaption to uplink congestion

**Per QoS flow or per DRB indication**

[R2-2408884](file:///D:\3GPP\Extracts\R2-2408884_On%20XR%20Rate%20Control.docx) On XR Rate Control Ericsson discussion Rel-19

* Noted

Proposal 1 Support DRB-level granularity for the MAC layer XR rate control signaling.

Proposal 2 Up to UE implementation which QoS flow is chosen for source rate adaptation.

Proposal 3 Reuse the recommended bit rate MAC CE for XR rate control signaling.

[R2-2408533](file:///D:\3GPP\Extracts\R2-2408533_XR%20rate%20control.docx) MAC signalling for data rate control for XR applications ZTE Corporation, Sanechips discussion

* Noted

Proposal 1: enhance the recommended bit rate MAC CE to cover XR applications in Rel-19 as follows:

 Support finer granularity of recommended bit rates to cover all the possible XR bit rates.

 Support recommended bit rates per QoS flow.

DISCUSSION on per DRB vs per QoS flow indication:

* LGE thinks the indication should be per QoS flow.
* OPPO think DRB level is sufficient, upper layers can further decide. Important thing is to limit the congestion.
* Nokia clarifies that we should clarify that DRB level does not require 1:1 mapping between QoS flow and DRB.
* Meta thinks that the point is to do per flow limitation. Meta thinks it is useless with DRB level.
* QCM indicates that application will obviously control per flow. The indication from gNB just informs UE how much bandwidth it has. How to map bitrate to apps should be up to UE.
* Apple prefers per QoS flow as it is more informative considering we can have N:1 mapping between flows and DRB.
* Xiaomi prefers DRB. Also for legacy we use LCH level. DRB level is more natural for gNB to control.
* Vivo thinks that in legacy situation was different. For XR we have a mix of different traffic types.
* QCM thinks network is not in a position to tell the UE which application it should limit.
* Ericsson doe not think gNB does not know which application should be rate-limited. gNB just cares about limiting the resources usage. MAC is not aware of QoS flows.
* ZTE thinks that if gNB does not care, then we could have per UE indication. In legacy we wanted to limit voice app.
* Ericsson is concerned about forcing MAC to know QoS flows. If application can adapt the flows then why do we need to bother?
* Meta thinks L4S was similar.
* LGE agrees that we were supposed to have a solution complementary to L4S and since L4S is per QoS flow, we also need per QoS flow.
* Lenovo agrees that per DRB is sufficient, we can rely on application to decide.
* Samsung indicates that gNB is responsible for QoS requirements enforcement so it should be up to NW which flow to throttle.
* Huawei thinks that we should do per QoS flow level.
* FFS if the indication is per DRB or per QoS flow. Companies should analyse the impact on QoS enforcement, interworking with L4S etc.

**Bit rate values indication**

[R2-2408345](file:///D:\3GPP\Extracts\R2-2408345_Uplink%20rate%20control%20for%20XR.docx) Uplink rate control for XR NEC discussion Rel-19 NR\_XR\_Ph3-Core

* Noted

Proposal 2: RAN2 to consider the following approaches to provide a finer granularity of recommended bit rate:

- Extend the Bit Rate field to cover finer granularity and wider range.

- Define a new bit rate table to provide sufficient granularity for XR traffic.

- Introduce finer values for the bitRateMultiplier.

DISCUSSION:

* Nokia is not sure if we need finer granularity.
* CATT asks how we judge whether granularity is OK or not.
* Futurewei thinks we may not need to refine the granularity. Futurewei thinks we can just extend the existing table which has some spare codepoints.
* LGE thinks that we need to first decide per DRB or per QoS.
* QCM agrees we need finer granularity, we should ask SA4 what values are needed.
* Sharp thinks there is a link with DRB and QoS flow discussion.
* Meta thinks we need to enhance in both DRB and QoS cases, because XR application are different.
* RAN2 to consider the following approaches to provide recommended bit rate values better fitting XR applications:

- Extend the Bit Rate field

- Define a new bit rate table to provide sufficient granularity for XR traffic

- Introduce new values for the bitRateMultiplier

* Send LS to SA4 asking about range/granularity which is required
* [AT127bis][507][XR] LS to SA4 on bit rate values (QCM)

Scope: LS to SA4 on bit rate values

Intended outcome: Agreeable LS

Deadline: Friday 2024-10-18 0900

|  |
| --- |
| **Agreements on XR rate control**   1. FFS if the indication is per DRB or per QoS flow. Companies should analyse the impact on QoS enforcement, interworking with L4S etc. 2. RAN2 to consider the following approaches to provide recommended bit rate values better fitting XR applications:  * Extend the Bit Rate field * Define a new bit rate table to provide sufficient granularity for XR traffic * Introduce new values for the bitRateMultiplier  1. Send LS to SA4 asking about range/granularity which is required |

[R2-2409273](file:///D:\3GPP\Extracts\R2-2409273%20LS%20on%20appropriate%20range%20and%20granularity%20of%20bit%20rates%20adaptation%20for%20XR%20applications.docx) LS on appropriate range and granularity of bit rate adaptation for XR applications RAN2 LS out NR\_XR\_Ph3-Core To:SA4

* Approved
* Futurewei thinks that with these contents we may not get clear reply from SA4.
* Huawei understands the comment from Futurewei, but there seems to be a confusion between different bit rate meaning.
* Vivo think the comment is reasonable but this is what should be discussed in SA4. From R2 point of view, the LS is clear enough.
* ZTE indicates that after reply from SA4, we will think how we can use it reasonably in RAN2.

[R2-2408631](file:///D:\3GPP\Extracts\R2-2408631%20Discussion%20on%20RAN%20Awareness%20and%20UL%20Rate%20Control%20for%20XR.docx) Discussion on RAN Awareness and UL Rate Control for XR Meta discussion

Proposal 3: Enhance the range and granularity of the bitrates in the recommended bit rate MAC CE.

**Network determination of XR rate adaptation**

[R2-2409077](file:///D:\3GPP\Extracts\R2-2409077%20XR%20rate%20control.docx) XR rate control Nokia, Nokia Shanghai Bell discussion

Proposal 1: For XR uplink rate control, RAN2 does not specify how RAN estimates uplink congestions and when RAN transmits the rate control signalling.

Proposal 2: For XR rate control, RAN2 discuss different options how the gNB identifies which QoS flows are subject to adaptive bitrate when provided with congestion information.

[R2-2408002](file:///D:\3GPP\Extracts\R2-2408002%20Discussion%20on%20XR%20rate%20control.docx) Discussion on XR rate control CATT discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408034](file:///D:\3GPP\Extracts\R2-2408034.docx) XR rate control Xiaomi discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408096](file:///D:\3GPP\Extracts\R2-2408096%20Consideration%20on%20Rate%20Control%20Enhancement%20for%20XR.docx) Consideration on rate control enhancement for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408107](file:///D:\3GPP\Extracts\R2-2408107%20Discussion%20on%20XR%20rate%20control.docx) Discussion on XR rate control TCL discussion

[R2-2408124](file:///D:\3GPP\Extracts\R2-2408124_Discussion%20on%20codec%20rate%20adaption.doc) Discussion on codec rate adaption vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408133](file:///D:\3GPP\Extracts\R2-2408133%20Discussion%20on%20XR%20rate%20control%20signaling.docx) Discussion on signaling enhancements for XR rate control Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408423](file:///D:\3GPP\Extracts\R2-2408423%20XR%20rate%20control.docx) UL Congestion Signaling Enhancements for XR Sharp discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408491](file:///D:\3GPP\Extracts\R2-2408491.docx) XR Rate Control Lenovo discussion NR\_XR\_Ph3-Core

[R2-2408579](file:///D:\3GPP\Extracts\R2-2408579%20Views%20on%20MAC%20Signaling%20for%20XR%20Rate%20Control.docx) Views on MAC Signalling for XR Rate Control Apple discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408722](file:///D:\3GPP\Extracts\R2-2408722_XR%20UL%20congestion.docx) Recommended bit rate based XR rate control Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2408773](file:///D:\3GPP\Extracts\R2-2408773%20-%20Discussion%20on%20uplink%20congestion%20signalling.docx) Discussion on uplink congestion signalling OPPO discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408780](file:///D:\3GPP\Extracts\R2-2408780%20Discussion%20on%20XR%20rate%20control.docx) Discussion on XR rate control Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408983](file:///D:\3GPP\Extracts\R2-2408983%20Discussion%20on%20rate%20control%20signaling%20for%20XR.docx) Discussion on rate control signaling for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2408984](file:///D:\3GPP\Extracts\R2-2408984%20UL%20rate%20control.docx) Discussion on UL rate control for Rel-19 XR Samsung discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2409084](file:///D:\3GPP\Extracts\R2-2409084%20Uplink%20congestion%20signalling.docx) Uplink congestion control signalling MediaTek Inc. discussion Rel-19 38.321 NR\_XR\_enh-Core

[R2-2409174](file:///D:\3GPP\Extracts\R2-2409174%20Discussions%20on%20XR%20UL%20rate%20control.docx) Discussions on XR UL rate control Futurewei discussion Rel-19 NR\_XR\_Ph3-Core