3GPP TSG-RAN WG2 Meeting #127 DRAFT\_R2-2407575

Maastricht, The Netherlands, 19th – 23rd August, 2024

Source: Session chair (Huawei)

Title: Report from session on R18 MBS, R18 QoE and R19 XR

# AT-meeting offline discussions:

* [AT127][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
* [AT127][501][XR] LS to RAN3 (Qualcomm)

 Scope: Reply LS to RAN3

 Intended outcome: Approved LS to RAN3 in R2-2407780

 Deadline: Agreeable LS available for offline approval: Friday 2024-08-23 0900

* [AT127][502][XR] Reply LS to SA2 (vivo)

 Scope: Reply LS to SA2

 Intended outcome: Approved LS to SA2 in R2-2407733

 Deadline: Agreeable LS available for offline approval: Friday 2024-08-23 0900

* [AT127][503][QoE] RRC CR (Ericsson)

 Scope: Update the RRC CR with the agreements from the meeting, discuss the related FFSes/wording improvements

 Intended outcome: Agreeable RRC CR in R2-2407734

 Deadline: CR available for offline approval: Friday 2024-08-23 0900

* [AT127][504][QoE] Release of QoE configurations (ZTE)

 Scope: Discuss whether/what changes are needed for release of QoE configurations as per R2-2406998 and/or R2-2407090

 Intended outcome: Report in R2-2407735 with the agreeable TPs

 Deadline: Report available for CB session on Thursday

* [AT127][505][MBS] RRC CR (Huawei)

 Scope: Update the RRC CR with the agreements from the meeting, discuss the related FFSes.

 Intended outcome: Agreeable RRC CR in R2-2407736

 Deadline: CR available for offline approval: Friday 2024-08-23 0900

* [AT127][506][MBS] MAC CR (Samsung/Apple)

 Scope: Draft MAC CR according to the agreements

 Intended outcome: Agreeable MAC CR in R2-2407737

 Deadline: CR available for offline approval: Friday 2024-08-23 0900

* [AT127][507][MBS] MBS and MT-SDT co-existence (Sharp)

 Scope: Continue discussion on R2-2406661 to check whether/what needs to be captured in specifications

 Intended outcome: Report with TP in R2-2407738

 Deadline: Report available for CB session on Thursday

## 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 continue to support maintenance related to their respective CR / WI and are required to follow drafting rules

- Single correction CR per spec coordinated by CR editor/rapporteurs will be agreed per feature for RAN#105

- 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.

- Companies should give inputs on editorials and clarifications to the CR editors/rapporteurs and not have individual CRs/contributions on such issues. Emails to CR editors/rapporteurs should follow the following naming convention when sending emails to rapporteurs:

 [Pre\_RAN2#127][CR xx.yyy] Clarification CRs

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

- Companies are expected to submit Tdocs with TP (not CRs). More specifically, the Tdoc should contain description of open issues/proposal and the proposed corrections/TP in the contribution itself. Small issues can be included in the tdoc with just short justification, same level of detail as in cover sheet. DraftCRs can be submitted for straightforward changes instead of Tdoc (i.e. DraftCRs count toward Tdoc limit)

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

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

Remaining/updated Rel-18 RRC parameters and MAC CEs

- RRC parameters updates/corrections, including those requested by other groups, e.g. RAN1, are covered by WI-specific RRC CRs.

- MAC CE parameters updates/corrections, including those requested by other groups, e.g. RAN1, are covered by WI-specific MAC CRs

Rel-18 UE capabilities

- EUTRA UE capabilities corrections are covered by separate CRs

- 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 merged with the running mega CR

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#127 deadlines:

* Tdoc Submission deadline: August 9th, 2024 1000 UTC

# 7 Rel-18

## 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

R2-2407750 Reply LS on the MBS broadcast service continuity and MBS session identification

* Noted

[R2-2407477](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407477%20Miscellaneous%20correction%20on%20eMBS.docx) Miscellaneous correction on eMBS Huawei, HiSilicon CR Rel-18 38.331 18.2.0 4955 - F NR\_MBS\_enh-Core

* Nokia, QCM thinks the changes are not essential and we don’t need this CR.
* [AT127][505][MBS] RRC CR (Huawei)

 Scope: Update the RRC CR with the agreements from the meeting, discuss the related FFSes/wording improvements

 Intended outcome: Agreeable RRC CR in R2-2407736

 Deadline: CR available for offline approval: Friday 2024-08-23 0900

### 7.11.2 Corrections

Corrections for all specifications

R2-2406333 Corrections on UE behavior in Multicast MCCH-Less Cell CATT, CBN, China Broadnet discussion Rel-18 NR\_MBS\_enh-Core

Proposal 1: Upon receiving group paging which indicates to allow the inactive multicast reception, if multicast MCCH is not present, UE initiates RRC resume if it was not configured to receive multicast in RRC\_CONNECTED. TP in Annex 1 is adopted.

Proposal 2: Upon receiving group paging which indicates to allow inactive multicast reception when UE is receiving multicast in RRC\_INACTIVE, UE checks whether the selected or reselected cell is multicast MCCH-less cell before reading multicast MCCH. TP in Annex 2 is adopted.

Proposal 3: Upon receiving RRCRelease, UE checks whether multicast MCCH is present before monitoring the multicast MCCH-RNTI, if UE selected to the same cell as the one receiving the active session in RRC\_CONNECTED. TP in Annex 3 is adopted.

DISCUSSION on P1:

* Nokia think the case in P1 is an error case.
* QCM agrees with the intent of P1, but wording can be improved.
* Huawei thinks that the situation in P1 can be avoided.
* Upon receiving group paging which indicates to allow the inactive multicast reception, if multicast MCCH is not present, UE initiates RRC resume if it was not configured to receive multicast in RRC\_CONNECTED. FFS the exact change (as part of offline#505)

DISCUSSION on P2:

* Huawei, vivo thinks the existing description already covers this case.
* Vivo thinks clarifying P1 is sufficient.
* QCM does not think current specs cover P2. Ericsson agrees with QCM.
* Nokia thinks this is an error case, QCM disagrees.
* Huawei thinks the UE will check this already during cell reselection.
* Upon receiving group paging which indicates to allow inactive multicast reception when UE is receiving multicast in RRC\_INACTIVE, UE checks whether the selected or reselected cell is multicast MCCH-less cell before reading multicast MCCH. FFS whether this is already covered by the current specs. (offline#505)

DISCUSSION on P3:

* QCM, Samsung supports the clarification. The wording can be simplified.
* Upon receiving RRCRelease, UE checks whether multicast MCCH is present before monitoring the multicast MCCH-RNTI, if UE selected to the same cell as the one receiving the active session in RRC\_CONNECTED.

[R2-2406507](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406507%20Corrections%20for%20Multicast%20Reception.docx) Corrections for Multicast Reception Samsung discussion Rel-18

Proposal 1: RAN2 to discuss the issues for error data handling and decide to adopt either TP 1A or TP 1B.

a) Error data handling should be limited to G-RNTI for "MBS multicast in RRC\_INACTIVE" (TP 1A, TP 1B)

b) Avoid redundancy between demultiplexing and error data handling procedures (TP 1B)

Proposal 2: Replace the term non-ServingCellMII used in clause 5.3.5.3 by “nonServingCellMII”. Adopt TP2.

Proposal 3: Add in the definition of PDSCH-ConfigBroadcast an additional term “multicast MCCH”. Adopt TP3.

DISCUSSION on P1:

* Apple thinks the intention is OK.
* Xiaomi thinks the clarification is needed.
* LGE thinks the current text is more generic, but it is still OK. It is already this is for suspended MRB.
* QCM slightly prefers to clarify.
* RAN2 to adopt TP 1A to clarify that error data handling should be limited to G-RNTI for "MBS multicast in RRC\_INACTIVE"
* [AT127][506][MBS] MAC CR (Samsung/Apple)

 Scope: Draft MAC CR according to the agreements

 Intended outcome: Agreeable MAC CR in R2-2407737

 Deadline: CR available for offline approval: Friday 2024-08-23 0900

* Replace the term non-ServingCellMII used in clause 5.3.5.3 by “nonServingCellMII”.

DISCUSSION on P3:

* Huawei thinks that MCCH covers both MC and BC MCCH.
* QCM does not think this is clear as we use MC/BC MCCH in a lot of places.
* Huawei thinks we need to check all other specs and other places.
* QCM indicates that MC MCCH is a different logical channel than (legacy) MCCH.
* Check whether we need to update MCCH to BC/MC MCCH. We come back next meeting.

[R2-2406661](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406661.doc) Data losing avoiding for multicast reception in RRC\_INACTIVE Sharp discussion

Proposal 1 When UE initiates RRC resume procedure only for mt-SDT, it should start monitoring G-RNTI(s) of joined MBS session(s) indicated by the TMGI(s) included in the paging message.

DISCUSSION:

* Xiaomi thinks the network may send two Paging messages to avoid this issue.
* Sharp thinks that this is for RRC INACTIVE, so the gNB may not have information about UE being configured to receive MC in INACTIVE.
* Ericsson think the network may move the UE to RRC CONNECTED in response to MT-SDT resume request
* CATT thinks the issue is valid.
* Xiaomi thinks it is a corner case.
* Offline to check if this is agreeable and how to capture in specs:
	+ - When UE initiates RRC resume procedure only for mt-SDT, it should start monitoring G-RNTI(s) of joined MBS session(s) indicated by the TMGI(s) included in the paging message. FFS how to capture in specs. (Offline#507 Sharp)
* [AT127][507][MBS] MBS and MT-SDT co-existence (Sharp)

 Scope: Continue discussion on R2-2406661 to check whether/what needs to be captured in specifications

 Intended outcome: Report with TP in R2-2407738

 Deadline: Report available for CB session on Thursday

R2-2407738

* When UE initiates RRC resume procedure with resumeCause set to mt-SDT, it should start monitoring G-RNTI(s) of joined MBS session(s) indicated by the TMGI(s) included in the paging message. FFS if there is spec impact (discuss in post-meeting e-mail discussion).

[R2-2406953](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406953%20%20%5BN103%5D%20%5BN105%5D%20Control%20plane%20aspects%20of%20multicast%20reception%20in%20RRC_INACTIVE%20state.docx) [N103] [N105] Control plane aspects of multicast reception in RRC\_INACTIVE state Nokia discussion Rel-18 NR\_MBS\_enh-Core

Proposal 1: When the UE receives stop monitoring G-RNTI indication in RRC release, it stops monitoring for data in the current cell and stop monitoring G-RNTI even after cell reselection to a cell that does not contain SIB24/MCCH (or PTM configuration).

Proposal 2: When the UE does not receive stop monitoring G-RNTI in RRC release, but only in MCCH, it stops monitoring data only in the cell where such indication is provided; and goes back to RRC\_CONNECTED even after cell reselection to a cell that does not contain SIB24/MCCH (or PTM configuration).

DISCUSSION:

* Ericsson agrees with P1.
* Samsung thinks that P1 was already agreed.
* Nokia clarifies that in their view this is not captured in specs.
* Huawei thinks it is captured
* Offline (Nokia) to check whether P1/P2 need to be reflected in specifications or current specifications is already correct. (CB Thursday)
* Nokia thinks there is still a problem and we need to clarify the UE behaviour. Proposal to discuss: “When the UE which was configured to receive MBS multicast in INACTIVE reselects to a new cell where there is no SIB24, it should trigger RRC resume.”
* CATT indicates that in case the UE was indicated to stop G-RNTI in the previous cell, it should not resume.
* Samsung thinks UE should always resume to make sure it has the latest information about the ongoing sessions.
* Ericsson supports the proposal from Nokia. If we don’t agree then the UE can get stuck. Clarifies that the session status may be different in different cells.
* Huawei is not sure with this as the UE should wait for Paging. Missing Paging would be a corner case.
* ZTE thinks the proposal is reasonable.
* When the UE which was configured to receive MBS multicast in INACTIVE reselects to a new cell where there is no SIB24, it should trigger RRC resume. Include the change in the post-meeting e-mail discussion for RRC.

[R2-2407395](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407395%20Validity%20of%20PTM%20configuration%20in%20RRCRelease.docx) Validity of PTM configuration in RRCRelease Ericsson discussion Rel-18 NR\_MBS\_enh-Core

Proposal 1 Clarify that inactivePTM-Config IE is always included in multicastConfigInactive IE.

Proposal 3 RAN2 to discuss if it needs to clarified when the UE can use the PTM configuration received in RRCRelease.

DISCUSSION on P1:

* CATT thinks current specs is clear.
* Huawei thinks P1 is contradicting previous agreements and current specs.
* Nokia agrees with CATT/Huawei that how the current specification is done is the intention.
* P1 is not pursued

DISCUSSION on P3:

* Qualcomm does not think we need to change anything.
* Xiaomi thinks it is not clear what happens with the stored configuration after the UE reselects the cell.
* P3 is postponed, it needs to be better clarified what changes in specifications are needed

[R2-2407474](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407474%20Correction%20on%20broadcast%20reception%20for%20eRedcap%20UE.docx) Correction on broadcast reception for eRedcap UE Huawei, HiSilicon CR Rel-18 38.300 18.2.0 0894 - F NR\_MBS\_enh-Core

* CR is agreed
* Nokia thinks the changes make it more difficult to read. Nokia thinks we can simplify.
* Huawei, vivo clarify that the way in the CR is aligned with what RedCap session decided to do.
* ZTE thinks current wording is OK and aligned with NGAP.
* Qualcomm thinks the proposal is OK, perhaps NGAP should also be corrected.

[R2-2407526](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407526%20RedCap%20UE%27s%20Multicast%20reception%20in%20RRC_INACTIVE%20-%20not%20a%20good%20idea.doc) RedCap UE's Multicast reception in RRC\_INACTIVE - not a good idea ZTE Corporation, Sanechips discussion Rel-18 NR\_MBS\_enh-Core

* Noted

**MBS TEI18**

**NOTE: Include TEI identifiers in agreed CRs.**

R2-2406281 Correction on the capabilities on PTM retransmission Huawei, HiSilicon, Intel Corporation, Nokia, vivo CR Rel-18 38.306 18.2.0 1134 - F NR\_MBS\_enh-Core, TEI18

[R2-2406282](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406282%20Correction%20on%20the%20capabilities%20on%20PTM%20retransmission.docx) Correction on the capabilities on PTM retransmission Huawei, HiSilicon, Intel Corporation, Nokia, vivo CR Rel-18 38.331 18.2.0 4867 - F NR\_MBS\_enh-Core, TEI18

* Add TEI18 identifier in the CR titles
* The CRs are agreed (to be discussed with UE capability rapporteur how to handle the clash with CRs agreed due to NTN support in MBS)

[R2-2406345](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406345%20%28Rel-18%29%20Correction%20on%20PTM%20Retransmission%20Capability.docx) Correction on PTM Retransmission Capability Samsung CR Rel-18 38.306 18.2.0 1135 - F NR\_NTN\_solutions-Core, NR\_MBS-Core

* The CR is agreed and merged into R2-2406281

DISCUSSION:

* Huawei thinks this was discussed in the common session last meeting and the understanding was that this is already clear form other capability descriptions.
* Nokia thinks this CR captures properly what’s been agreed.

[R2-2407527](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407527%20Search%20space%20configuration%20for%20RedCap%20UE%E2%80%99s%20MBS%20broadcast%20reception.doc) Search space configuration for RedCap UE’s MBS broadcast reception ZTE Corporation, Sanechips discussion Rel-18 TEI18

* Postponed to the next meeting to try to come up with an acceptable wording (e.g. a guideline for the NW rather than requirement)
* ZTE thinks the intention seems to be agreeable, but the exact change can be discussed further.
* Ericsson agrees it is good to capture this use case and the current wording is OK.
* Nokia does not see the need for this implementation guideline, but is OK if majority wants it. Huawei agrees with Nokia. Previous sentence already covers it for the most part, but the NW may not be able to ensure what is proposed to be captured.
* CATT agrees with Nokia and Huawei. Even if it happens, the UE will attempt to decode.
* QCM prefers network to follow the guideline that is proposed..

## 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

R2-2407088 Correction of Enhancement on NR QoE management and optimizations for diverse services Ericsson CR Rel-18 38.331 18.2.0 4922 - F NR\_QoE\_enh-Core

* Samsung indicates appLayerBufferLevelList has granularity of 10ms, so the change in the CR is not correct.
* Remove “ms” from “If the buffer level is larger than the maximum value of 30000 ms (5 minutes), the UE reports 30000.”
* Other changes are agreeable
* CR to be updated with the agreements from the meeting
* [AT127][503][QoE] RRC CR (Ericsson)

 Scope: Update the RRC CR with the agreements from the meeting

 Intended outcome: Agreeable RRC CR in R2-2407734

 Deadline: CR available for offline approval: Friday 2024-08-23 0900

### 7.14.2 Corrections

*Corrections to all specifications.*

[R2-2407001](file:///D%3A%5C%5C3GPP%5C%5CExtracts%5C%5CR2-2407001%20Correction%20for%20RRC%20spec%20on%20R18%20QoE.doc%22%20%5Co%20%22D%3A3GPPExtractsR2-2407001%20Correction%20for%20RRC%20spec%20on%20R18%20QoE.doc) The correction for RRC spec for R18 QoE CATT draftCR Rel-18 38.331 18.2.0 F NR\_QoE\_enh-Core

* Huawei thinks first change is not needed as the added condition is always true.
* CATT clarifies that maybe this can be reflected in the field description. ZTE is OK to clarify in the field description.
* Nokia thinks 1st change is not needed. Ericsson agrees.
* Ericsson thinks 2nd change is incorrect.
* 1st change is not needed
* Discuss 2nd change offline (offline#503, Ericsson)
* Change 4 is agreed and will be merged into rapp CR

[R2-2406998](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406998%20Consideration%20on%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

Proposal 1: Specify in LTE RRC specs that the UE should release the IDLE/INACTIVE states QoE configurations/reports stored in the AS layer, if any, upon successful RRC connection establishment; and inform the application layer to release the corresponding QoE configuration stored.

Proposal 2: Send LS to inform SA4 and CT1 that RAN2 has agreed to update LTE RRC specs that upon successful RRC Connection establishment procedure in LTE UE will release the NR QoE configurations/reports stored in both the AS layer and the application layer, and ask them to check if their specs requires any updates.

Proposal 3: Add in the description of AppLayerIdleInactiveConfig in RRC specs that this parameter is also applicable to connected states.

DISCUSSION on P1:

* Samsung thinks that this is a relevant issue, but we should not impact LTE.
* QCM also thinks this is a relevant issue, but the UE may also go back to NR. Perhaps it is best to specify this upon UE entering RRC IDLE in NR specs.
* Ericsson acks the problem, perhaps offline is needed to decide how to solve it.
* Huawei thinks another scenario is when UE is in NR RRC IDLE state and then the UE moves to LTE cell for connection establishment. OK to discuss offline.
* Offline on the issue of improperly stored IDLE/INACTIVE QOE configs and how to solve it (ZTE)
* [AT127][504][QoE] Release of QoE configurations (ZTE)

 Scope: Discuss whether/what changes are needed for release of QoE configurations as per R2-2406998 and/or R2-2407090

 Intended outcome: Report in R2-2407735 with the agreeable TPs

 Deadline: Report available for CB session on Thursday

DISCUSSION on P3:

* Ericsson thinks some rewording may be needed
* Discuss offline (offline#503)

R2-2407735

Proposal 1: UE shall release its stored NR QoE configuration and possible QoE reports for below cases:

  Case 1: UE reselects to EUTRA after during RRC connection reestablishment and establish connections to EUTRA

 Case 2: UE is in NR RRC IDLE state and then the UE moves to LTE cell for connection establishment.

Proposal 2: RAN2 agrees on the corrections provided in R2-2407090. If not agreeable, RAN2 captures in chairman’s note that RAN2 understands based on existing specs, UE will release all LTE QoE configurations when HO from LTE/5GC to NR.

* Qualcomm thinks another case to consider is when the UE in RRC ILDE/INACTIVE reselects to EUTRA.
* ZTE thinks we need to check this case further.
* UE shall release its stored NR QoE configuration and possible QoE reports/variables for below cases:
	+ - Case 1: UE reselects to EUTRA after during RRC connection reestablishment and establish connections to EUTRA
		- Case 2: UE is in NR RRC IDLE state and then the UE moves to LTE cell.
* We intend to correct this from Rel-18. FFS where (LTE or NR specs) and how to address this in specs.

DISCUSSION on P2:

* Huawei thinks that this is already covered.
* Ericsson thinks there may be a fault in the specifications, because it is unclear whether certain actions are executed.
* Lenovo also thinks what we already have is generic and should apply.
* R2-2407090 is postponed to check if specs already covers properly the needed behaviour

[R2-2407168](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407168%20Miscellaneous%20Stage-2%20corrections%20on%20R18%20QoE.docx) Miscellaneous Stage-2 corrections on R18 QoE Nokia, Nokia Shanghai Bell,China Unicom CR Rel-18 38.300 18.2.0 0886 - F NR\_QoE\_enh-Core

* Ericsson think 1st change is worded strangely, so we may improve the text.
* Change “The QoE Measurement Collection deactivation permanently stops all or some of the QoE measurement collection(s) configured at a UE” to “The QoE Measurement Collection deactivation permanently stops all or some of the QoE measurement collection configurations at a UE”
* With this change the CR is agreed unseen in R2-2407731

[R2-2407336](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407336%20Correction%20on%20area%20scope%20checking%20for%20MBS%20QoE.docx) Correction on area scope checking for MBS QoE Huawei, HiSilicon draftCR Rel-18 38.331 18.2.0 F NR\_QoE\_enh-Core

* Ericsson agrees with the second change. 1st change is OK, but it causes another issue, so perhaps it is not needed. QCM agrees with Ericsson.
* Samsung also does not think the first change is not needed.
* First change is not needed
* 2nd change is agreed

[R2-2407339](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407339.docx) Correction on application layer measurement report re-submittion Google CR Rel-18 38.331 18.2.0 4946 - F NR\_QoE\_enh-Core

* Ericsson agrees we need to correct this.
* The change is agreed

[R2-2407090](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx) Release of QoE measurements at successful handover from LTE Ericsson, Nokia, Nokia Shanghai Bell CR Rel-18 36.331 18.2.0 5048 - F NR\_QoE\_enh-Core

*Moved from 7.0.2.8*

* QCM thinks the CR is OK, but wonders whether there is an issue with the other direction.
* Huawei thinks that in the current specifications it is already clear.
* ZTE thinks the procedure mentioned by Huawei is only executed in the failure case.
* Offline (discuss as part of offline#504)

# 8 Rel-19

## 8.7 XR Enhancements Ph3

(NR\_XR\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-240791)

Time budget: 2 TU

Tdoc Limitation: 4 tdocs

### 8.7.1 Organizational

LS, Rapporteur input, including workplan, etc.

**Rapporteur input**

[R2-2406395](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406395%20XR%20Work%20Plan.docx) XR Workplan Nokia, Qualcomm (Rapporteurs) Work Plan Rel-19 NR\_XR\_Ph3-Core

[R2-2406396](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406396%20XR%20Agreements.docx) XR Agreements Nokia, Qualcomm (Rapporteurs) discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406397](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406397%20XR%20SA2%20Overview.docx) SA2 Overview Nokia, Qualcomm (Rapporteurs) discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406398](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406398%20XR%20RAN3%20Overview.docx) RAN3 Overview Nokia, Qualcomm (Rapporteurs) discussion Rel-19 NR\_XR\_Ph3-Core

* 4 Tdocs above noted
* Nokia reminds we start RRM meas gaps discussion in October.

**LS in**

[R2-2406216](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406216_R1-2405736.docx) LS on UE assistance information (R1-2405736; contact: Nokia) RAN1 LS in Rel-19 NR\_XR\_Ph3-Core To:RAN4 Cc:RAN2

* Noted

[R2-2406221](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406221_R3-243957.docx) LS on UL PSI based PDU discarding in NR-DC (R3-243957; contact: Qualcomm) RAN3 LS in Rel-19 NR\_XR\_Ph3-Core To:RAN2

* Noted

[R2-2406222](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406222_R3-243958.docx) Response LS on FS\_XRM Ph2 (R3-243958; contact: Lenovo) RAN3 LS in Rel-19 FS\_XRM\_Ph2 To:SA2 Cc:RAN2, SA4

* Noted

[R2-2406241](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406241_S2-2407351.doc) LS on FS\_XRM Ph2 (S2-2407351; contact: vivo) SA2 LS in Rel-19 FS\_XRM\_Ph2 To:SA4, RAN2, RAN3

* Noted

[R2-2406242](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406242_S4-241370.doc) LS Reply on FS\_XRM Ph2 (S4-241370; contact: Huawei) SA4 LS in Rel-19 FS\_XRM\_Ph2, FS\_5G\_RTP\_Ph2 To:SA2 Cc:RAN2, RAN3

- Intel thinks there are some replies we should consider in RAN2 work. Intel encourages companies to evaluate how this can be considered from RAN2 point of view.

* Noted

#### 8.7.1.1 Discussion on incoming LSs

Discussion on RAN2 replies to SA2 LS on FS\_XRM Ph2 (S2-2407351) and RAN3 LS on UL PSI based PDU discarding in NR-DC (R3-243957)

**Reply to RAN3 LS on PSI based discarding in NR-DC**

[R2-2406254](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406254%20Discussion%20on%20reply%20to%20RAN3%20LS%20on%20PSI-based%20PDU%20discard%20in%20NR-DC.docx) Discussion on reply to RAN3 LS on PSI-based PDU discard in NR-DC Qualcomm Incorporated, Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1. UE activates PSI-based SDU discard on a UL split-bearer only after it has received MAC CEs activating the discard from both MN and SN.

Proposal 2. UE deactivates PSI-based SDU discard on a UL split-bearer once it has received a MAC CE deactivating the discard from either MN or SN.

Proposal 3. After receiving a PSI-Based SDU Discard De-/Activation MAC CE on the primary path that activates SDU discard, UE applies a smaller ul-DataSplitThreshold.

Proposal 4. After receiving a PSI-Based SDU Discard De-/Activation MAC CE on the secondary path that activates SDU discard, UE applies a larger ul-DataSplitThreshold.

Proposal 5. UE applies the legacy ul-DataSplitThreshold if both primary and secondary paths are in congestion state.

Proposal 6. Adopt the above enhancements (Proposal 1~5) as Rel-18 corrections too.

Proposal 7. Include the above enhancements, if agreed, in the reply LS to RAN3.

[R2-2407216](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407216%20%28R19%20NR%20XR%20A8711_Discussion%20on%20LSs%20from%20SA2%20and%20RAN3%29.docx) Discussion on incoming LSs InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3: Reply to RAN3 with the following:

• The likelihood of the PDCP entity in the UE receiving inconsistent commands from the MN and SN nodes is low.

• PSI level that triggers discarding at PDCP is up to UE implementation, resulting in little impact in the unlikely event of inconsistent commands from the MN and SN nodes.

• RAN2 does not think any UE behaviour needs to be specified for handling uplink PSI based SDU discard for split bearer.

DISCUSSION:

* ZTE indicates that it was a decision in RANP that this objective should not impact RAN2. RAN3 can do coordination at NW side. We should follow WID and just reply what we have now.
* Apple agrees with P1 from QCM as it would allow optimizing the behaviour, but is OK to follow majority.
* OPPO thinks NW coordination can be done, but in R2 we can just keep our specs as they are.
* CATT, Xiaomi, vivo agrees with ZTE and OPPO.
* Xiaomi indicates the same behaviour is for PDCP duplication.
* QCM indicates R3 does not believe in coordination between the nodes, that is why they sent the LS.
* CMCC thinks we can tell R3 that there may be coordination needed in the network.
* Nokia does not like NW coordination solution.
* Ericsson thinks no NW coordination is needed. It works OK as it is now.
* Huawei think we just reply with the current behaviour. For R18, we should not change anything.
* Intel agrees we should not touch R18, but there is some valid point in R3 LS.
* QCM indicates that the current behaviour is not optimal and there is a simple way to improve.

**For the reply LS to RAN3:**

* We just reply how this works in R2 specs
* Whether to apply NW side solution to improve is up to RAN3
* [AT127][501][XR] LS to RAN3 (Qualcomm)

 Scope: Reply LS to RAN3

 Intended outcome: Approved LS to RAN3 in R2-2407780

 Deadline: Agreeable LS available for offline approval: Friday 2024-08-23 0900

R2-2407780

**Reply to SA2 LS on XRM Ph2**

[R2-2406433](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406433_Discussion%20on%20LS%20from%20SA2%20on%20FS_XRM%20Ph2.docx) Discussion on LS from SA2 on FS\_XRM Ph2 vivo discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1: RAN2 thinks indicating periodicity via in-band signaling for dynamic changes of the periodicity is not needed.

Proposal 2: RAN2 thinks the time to next burst is not useful for RAN resource scheduling.

[R2-2406675](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406675%20On%20Responses%20to%20SA2%20and%20RAN3%20LS%20for%20XR.docx) On Responses to SA2 and RAN3 LS for XR Apple discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1: RAN2 should reply to SA2 that, in-band signaling for dynamic changes of traffic periodicity may be useful in terms of UE power saving, if the application server can provide the information and if NG-RAN can use such information properly.

Proposal 2: RAN2 should reply to SA2 that, the information of the time to next burst may be useful. However, RAN3 is better positioned to evaluate whether jitter can be compensated by the NG-RAN when such information is used.

DISCUSSION on whether dynamic periodicity indication and/or time to next burst (TTNB) is useful:

* Mediatek agrees with vivo, thinks no additional info is needed.
* CMCC thinks periodicity is semi-static, not dynamic, so the benefit is unclear. TTNB is useful for scheduling.
* Lenovo thinks TTNB was discussed in the past.
* Nokia thinks there is a benefit for power saving from TTNB, but if periodicity is dynamic it can be handled with TTNB.
* NEC thinks dynamic periodicity is not needed. TTNB is useful.
* Ericsson thinks dynamic periodicity is more efficient than CP based solution. TTNB is similar, but in case there is jitter, this information may not be always reliable.
* Meta is in general supportive of dynamic periodicity as the periodicity can change dynamically. Xiaomi agrees.
* Samsung believes TSCAI is enough for periodicity. TTNB does not consider jitter, so it may not be useful for the gNB.
* LGE thinks whether this is useful depends on how dynamic changes are expected.
* Huawei thinks we need to focus on whether this is useful. If periodicity is very dynamic then TTNB can handle it. If it does not, then existing solution is enough.
* ZTE, vivo think that the periodicity changes should not be too frequent. If they are very frequent, then it should be handled with TTNB.
* ZTE asks whether this is for both DL and UL? Thinks it is more useful for UL.
* From RAN2 periodicity can already be provided to gNB via TSCAI and/or UAI, which is sufficient for infrequent periodicity changes.
* RAN2 does not have consensus on whether additional indication for dynamic changes of the periodicity are needed.
* RAN2 thinks TTNB may be useful for the NW scheduling for DL, provided it is provided in advance and is reliable and accurate at RAN.
* [AT127][502][XR] Reply LS to SA2 (vivo)

 Scope: Reply LS to SA2

 Intended outcome: Approved LS to SA2 in R2-2407733

 Deadline: Agreeable LS available for offline approval: Friday 2024-08-23 0900

R2-2407733

[R2-2406253](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406253%20Draft%20reply%20to%20RAN3%20LS%20on%20UL%20PSI%20based%20PDU%20discarding%20in%20NR-DC.docx) Reply to RAN3 LS on UL PSI based PDU discarding in NR-DC Qualcomm Incorporated LS out Rel-19 NR\_XR\_Ph3-Core to:RAN3

[R2-2406255](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406255%20Discussion%20on%20reply%20LS%20to%20SA2%20on%20FS_XRM%20Ph2.docx) Discussion on reply LS to SA2 on FS\_XRM Ph2 Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406303](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406303%20Discussion%20on%20incoming%20LSs_final.docx) Discussion on incoming LSs Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406399](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406399%20XR%20TTNB%20LS.docx) Periodicity and Time to Next Burst Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406408](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406408.docx) Discussion on SA2 and RAN3 LSs for Rel-19 XR Xiaomi discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406434](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406434_Discussion%20on%20LS%20from%20RAN3%20on%20UL%20PSI%20based%20PDU%20discarding%20in%20NR-DC.docx) Discussion on LS from RAN3 on UL PSI based PDU discarding in NR-DC vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406457](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406457%20LSin%20Discussion_v00.docx) Discussion on LSs for XR ZTE Corporation, Sanechips discussion

[R2-2406472](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406472__LS-Views__R19-XR.docx) RAN2 views and responses to LSs from SA2, RAN3 and SA4 Intel Corporation discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406480](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406480%20XRM%20PSI%20Discard.docx) Discussion on XRM and UL PSI-based PDU Discard Sharp discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406558](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406558%20Discussion%20on%20SA2%20and%20RAN3%20LSs.docx) Discussion on SA2 and RAN3 LSs CATT discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406566](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406566.docx) Discussion on SA2 LS on FS\_XRM Ph2 and RAN3 LS on UL PSI based PDU discarding in NR-DC NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406624](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406624_XR%20Reply%20LS.docx) Views on LSs for SA2 and RAN3 Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2406781](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406781%20-%20Discussion%20on%20the%20LS%20from%20SA2%20and%20RAN3.docx) Discussion on the LS from SA2 and RAN3 OPPO discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406783](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406783%20Discussion%20on%20imcoming%20LSes.docx) Discussion on incoming LSs Samsung discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406892](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406892%20Discussion%20on%20RAN2%20replies%20to%20LS.docx) Discussion on RAN2 Replies to LS Lenovo discussion Rel-19

[R2-2406913](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406913_Discussion%20on%20SA2%20and%20RAN3%20LSs%20for%20XR.docx) Discussion on SA2 and RAN3 LSs for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407044](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407044%20-%20Discussion%20on%20LSs%20from%20SA2%20and%20RAN3.docx) Discussion on LSs from SA2 and RAN3 Ericsson discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407276](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407276%20Discussion%20on%20SA2%20and%20RAN3%20LSs%20on%20Rel-19%20XR.docx) Discussion on SA2 and RAN3 LSs on Rel-19 XR Meta discussion

[R2-2407383](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407383%20Discussion%20on%20LS%20on%20FS_XRM%20Ph2%20and%20UL%20PSI%20based%20PDU%20discarding%20in%20NR-DC.doc) Discussion on LS on FS\_XRM Ph2 and UL PSI based PDU discarding in NR-DC CMCC discussion Rel-18 NR\_XR\_Ph3-Core

### 8.7.2 Multi-modality support

Objective: Study and if justified, specify aspects related to multi-modality (intra-UE) (with coordination with SA2/SA4 as needed by LS request). Aim to facilitate efficient and effective support for XR application with Multiple QoS flows with multi-modal inter-dependencies, meeting multi-modal QoS requirements, e.g. synchronization and/or coordination. Efficiency enhancements are expected to be visible in terms of capacity or power consumption.

Including aspects such as:

* potential enhancements based on multi-modal information awareness depending on traffic direction (UL/DL)
* can the multi-modal information be provided from the UE
* other enhancements for multi-modal traffic not strictly related to multi-modality awareness, e.g. power saving, scheduling

**Multi-modal info from the UE**

[R2-2406625](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406625_XR%20multi%20modality.docx) Need for MMSID and DRB mapping Sony discussion Rel-19 NR\_XR\_Ph3

Proposal 1: RAN2 assumes that multi modal service ID is received in RAN from the core network i.e. there is no need for UE to provide this information to the gNB.

[R2-2406916](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406916%20R19%20XR%20Multi-Modality_r2.docx) Further aspects of multi-modality support in RAN Samsung R&D Institute UK discussion

Proposal 3. Regardless of SA2 decision, RAN2 to consider extending the UAI for multi-modal awareness at least for uplink QoS flows in Rel-19 XR, by having the UE report existence of multi-modality application and association information among QFIs to gNB.

Proposal 4. If SA2 decides that CN-based solution on multi-modal awareness for RAN will not be considered in Rel-19 XR, RAN2 to discuss the UAI extension from Proposal 3 as an alternative for downlink QoS flows MM treatment in Rel-19 XR.

DISCUSSION:

* OPPO thinks UE can provide this information considering the lack of info from SA2. Support P3 from Samsung. For DL, see no need to discussion RAN2.
* Xiaomi thinks for DL SA2 agreed to provide MMSID, but for UL it should be from the UE.
* LGE thinks for UL UE has better knowledge about the association as it is determined by app layer.
* CMCC thinks that for UL UE can get this information from APP layer and provide this information to gNB.
* Lenovo thinks we should make the decision based on SA2 reply. ZTE agrees. If SA2 does not reply, then we need to rely on UAI. They think both UL and DL can be available from the UE, if needed.
* Qualcomm agrees with Lenovo.
* Vivo agrees with Samsung. Vivo can think make a decision for UL part in RAN2, we cannot wait for SA2.
* Nokia tends to agree with Lenovo, they understand the situation in SA2 is a bit different.
* Huawei thinks it is OK to include MMSID in UAI. In Rel-18 we have both CN solution and UAI. There are cases where this can only come form the UE.
* Fujitsu agrees with Huawei and Samsung, it is similar for UAI in Rel-18.
* Meta also thinks that UL is independent from SA2.
* Apple thinks SA2 can technically provide this information, but they want to understand the reason we need it.
* Ericsson thinks we need to discuss how we use this information.
* Working assumption: Regardless of SA2 decision, RAN2 can extend the UAI for multi-modal awareness at least for uplink QoS flows in Rel-19 XR, by having the UE report existence of multi-modality application and association information among QFIs to gNB.
* FFS how this is used by the gNB. FFS whether this can be applied to DL.

**How is multi-modal information used**

[R2-2406559](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406559_Discussion%20on%20Multi-Modality.docx) Discussion on Multi-Modality CATT discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 5: Scheduling/LCP enhancements can be considered for multi-modality.

Proposal 6: Admission control enhancement can be considered for multi-modality.

DISCUSSION:

* NEC supports proposals 5 and 6.
* Xiaomi thinks SA2 discussed about integrated handling and is not sure we should consider it. For P5, Xiaomi thinks this can be left up to gNB implementation. See no need to enhance LCP.
* Mediatek thinks that enhancing LCP is too complex.
* Qualcomm is concerned about P5 as it has huge impact on UE complexity. WID already clarifies that the impact should be limited.
* vivo supports the proposals and the exact solution depends on exact information we get. We can take complexity into consideration.
* Spreadtrum thinks delay-aware LCP can be reused for sync requirement.
* Nokia has concerns on the complexity with P5. This can be handled by gNB scheduling.
* Huawei thinks admission control is one use case for multi-modality information. Even with no spec impact, gNB can consider this info.
* Ericsson thinks a conclusion in SA2 was that application layer can handle joint admission control for multiple flows. Ericsson thinks benefits of LCP enhancements are unclear.
* ZTE thinks what we can do depends on what information we have. ZTE thinks the more information we get, the more things we can do.
* CMCC thinks that LCP enhancements can be used to properly multiplex data into TB.
* Google thinks P6 is a low-hanging fruit with no RAN2 spec impact. For P5 it is not clear what we can do, it depends on the information we can get.
* Lenovo thinks for LCP the main question is whether we consider synchronization thresholds.
* Apple asks how MAC can know which packets are associated together, this is too complex.
* Ericsson asks if multi-modal information is MMSID or sth else.
* ZTE thinks another use of MMSID is for QoS flow to DRB mapping.
* RAN2 considers that based on multi-modal information:
	+ - The gNB may perform joint admission control. Details can be left up to RAN3 in potential WI phase. FFS if MMSID can be used for this purpose.
* **The gNB may consider this information during QoS flow to DRB mapping (up to gNB implementation)**

[R2-2406589](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406589%20Discussion%20on%20Multi-modality%20support%20for%20XR%20traffic.doc) Discussion on Multi-modality support for XR traffic Xiaomi Communications discussion

Proposal 2 QoS flow level synchronization is prioritized over packet/frame level synchronization. It is gNB implementation on how to achieve QoS flow level synchronization.

Proposal 3 For multi-modal QoS requirements, LCP enhancement will not be considered until the requirement of multi-modal QoS is clear enough.

Proposal 4 PDU set based discarding across PDU sets/QoS flows should not be considered until we get requirement from SA2.

DISCUSSION on P2:

* Lenovo thinks that for UL we don’t do any LCP enhancements.
* CMCC would like to still consider UL LCP enhancements.
* Lenovo indicates that whether the gNB can do packet or flow level synchronization depends on what information we can get from SA2. ZTE, OPPO agree.
* OPPO wonders if we can have flow level sync for UL.
* Ericsson asks how flow level synchronization can be achieved.
* LGE clarifies that gNB may e.g. map flows to the same DRB to make sure they are sent together.
* For UL, RAN2 does not intend to perform LCP enhancements due to complexity vs gains concerns.
* For DL, whether traffic synchronization (on a per packet basis) can be achieved depends on whether packet level synchronization information can be provided from CN to RAN.

[R2-2407135](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407135%20Multi-modality%20support%20for%20XR.docx) Multi-modality support for XR Google Ireland Limited discussion

Proposal 3: Awareness of synchronization requirements would enable the RAN to make informed scheduling decisions, improving the quality and reliability of multi-modal XR applications.

Proposal 4: Study the optimization of PDU-Set discard and prioritization across QoS flows of the same multi-modal service based on the dependency information between the mutli-modal flows and the unmet synchronization requirements.

DISCUSSION on PDU set discard enhancements:

* QCM thinks that joint discard would require packet level synchronization and only app layer knows this.
* LGE think inter-QoS flow discard should also be excluded due to complexity.
* Vivo supports P4 from Google. Think that we can still consider flow level synchronization to support this.
* MTK agrees with Qualcomm and LGE.
* Samsung is supportive of the proposal and agrees with vivo. It is less complex than changing LCP.
* Apple thinks this also depends on what information we can get from SA2. It is not clear that we can drop packets from different flows. OPPO share views with Apple. OPPO suggests to check with SA2/SA4.
* Nokia agrees with Qualcomm. It will be complex, especially in case of traffic in different DRBs.
* Sharp indicates that this mechanism is performed in upper layers, so this is less complex than LCP. OK to ask SA2/SA4 about whether the required information can be available.
* QCM indicates that the main complexity issue is with mapping packets which need to be synchronized.
* Ericsson agrees with QCM, Nokia and wonders about the gains.
* LGE is concerned about the complexity, especially in cross-DRB scenario.
* Ericsson thinks this is too complex and gains were not shown.
* Futurewei thinks there are two levels of information to be considered – dependency and synchronization.
* RAN2 thinks PDU Set discard across QoS flows of the same multi-modal service based on the dependency information between the mutli-modal flows can only be achieved in case the synchronization information can be available at the UE which is up to SA2/SA4.
* RAN2 thinks in case this is feasible, it should be limited to intra-DRB case.

**DRX enhancements**

[R2-2407045](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407045%20-%20Discussion%20on%20Multi-Modality.docx) Discussion on Multi-Modality Ericsson discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 2 Support multiple active DRX configurations to limit the delay and optimize power saving of UEs with multi-flow XR services.

Proposal 3 Support independent configuration parameters for the secondary DRX group.

DISCUSSION on P2:

* Qualcomm thinks that power savings are not very big while the complexity is significant for the UE.
* Nokia indicates that there is an active time where the UE is awake so can be scheduled at that times. No need to introduce additional complexity.
* Spreadtrum thinks this enhancement is not needed.
* Xiaomi sees some benefits if some flows are integer while some are non-integer. Think we can have a single DRX cycle with multiple on-durations.
* Huawei agrees with QCM, Nokia. We can handle multi-modal flows with single DRX.
* LGE thinks single DRX is not enough to align with multiple periodicity, so supports having this.
* Sharp agrees with complexity issue mentioned by Qualcomm. Think SPS/CG can be used as well as this does not affect DRX cycle.
* Samsung thinks multiple DRX is useful.
* ZTE thinks with multi-modal traffic UE will anyway be active for the most time. This seems to be an unnecessary optimization.
* Ericsson thinks that SPS/CG may not always be used, e.g. in the view of jitter.
* Apple supports Ericsson.
* Not support multiple active DRX configurations

Ericsson would like to focus on the following proposal: “Proposal: Support independent configuration of drx-StartOffset for the secondary DRX group”

DISCUSSION:

* Qualcomm is OK to consider drx-StartOffset, but not other parameters, e.g. DRX timers, cycle.
* Huawei agrees with QCM. Thinks the reason to introduce was to support FR2 and different SCS. Asks what’s the use case.
* Ericsson clarifies that additional offset helps to handle jitter.
* Lenovo is not sure about the usefulness as this would mean that we map different traffic to different FR.
* Mediatek thinks if it is supposed to handle jitter, then it is complex.
* LGE also does not see then need and feels single DRX configuration is sufficient.
* Apple also does not see the relation to multi-modality.
* Not support independent configuration of drx-StartOffset for the secondary DRX group

**Scheduling enhancements**

[R2-2406302](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406302%20Discussion%20on%20multi-modal%20XR_final.docx) Discussion on multi-modal XR Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3: Scheduling enhancements are needed to support multi-modal XR services with haptic data from the haptic KPI and the network capacity point of view.

* Noted

DISCUSSION:

* Ericsson appreciates the simulations, but they do not show what the capacity is for haptic traffic. Ericsson is not sure what enhancements can be done for the traffic with such tight requirements.
* Qualcomm thinks the simulated case is not likely in the near future. Qualcomm thinks that Rel-18 enhancements can be already used for this kind of traffic, also URLLC enhancements are relevant. No need for anything additional.
* Apple indicates that this would have RAN1 impact and we should not involve them. Agrees with QCM.
* Vivo supports Huawei observation and proposal. Some further enhancements are needed for this kind of requirements.
* OPPO share view with QCM and Apple. Not sure about additional solutions, RAN1 should be involved.
* Xiaomi doubts the requirements are valid.
* Sony thinks that we had simulations in R18 and it showed some gains of resource sharing, but this is already possible.
* Nokia thinks that shared CG is already possible by implementation.
* Sharp thinks some enhancements might be needed, but we already have enough to discuss.
* Ericsson indicates it is too late.

[R2-2406370](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406370%20%20Discussion%20on%20Multi-modality%20for%20XR.docx) Discussion on Multi-modality for XR TCL discussion Rel-19

[R2-2406435](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406435_Discussion%20on%20Multi-modality.doc) Discussion on Multi-modality vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406463](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406463_xrMultiModality_v01.docx) Multi-modality assistance information for RAN awareness ZTE Corporation, Sanechips discussion

[R2-2406473](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406473__Multi-modal__R19-XR.docx) UE/RAN enhancements considering multi-modal awareness Intel Corporation discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406525](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406525%20Discussion%20on%20DRX%20enhancement%20for%20multimodality.docx) Discussion on DRX enhancements for multi-modality ASUSTeK discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406547](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406547_multi-modal.doc) Discussions on Multi-modality XR Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406567](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406567.docx) Potential enhancements based on multi-modal information awareness NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406595](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406595.docx) Enhancements for support of Multi-Modal XR applications Lenovo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406662](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406662.doc) Discussion on Multi-Modality Sharp discussion

[R2-2406676](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406676%20Views%20on%20Support%20of%20Multi-Modality%20Services%20in%20Rel-19%20XR.docx) Views on Support of Multi-Modality Services in Rel-19 XR Apple discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406740](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406740%20Discussion%20on%20XR%20multi-modality.docx) Discussion on XR multi-modality China Telecom discussion

[R2-2406760](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406760.doc) Discussion on enhancements for XR Multi-modality Spreadtrum Communications discussion Rel-19

[R2-2406782](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406782%20-%20Discussion%20on%20the%20multi-modality%20support.docx) Discussion on the multi-modality support OPPO discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406864](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406864%20Discussion%20on%20scheduling%20enhancements%20for%20multi-modal%20traffic.docx) Discussion on scheduling enhancements for multi-modal traffic ITRI discussion NR\_XR\_Ph3-Core

[R2-2406914](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406914_Discussion%20on%20Multi-modal%20support%20for%20XR.docx) Discussion on Multi-modal support for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406988](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406988%20Further%20discussion%20on%20multi-modality%20support%20for%20XR.docx) Further discussion on multi-modality support for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407213](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407213%20%28R19%20NR%20XR%20A872_Multi%20modality%20support%29.docx) Multi-modality support for XR InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407225](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407225%20Discussion%20on%20multi-modality.docx) Discussion on multi-modality MediaTek Inc. discussion Rel-19

[R2-2407277](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407277%20Discussion%20on%20Multi-Modality%20XR.docx) Discussion on Multi-Modality XR Meta discussion

[R2-2407356](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407356%20Multi-modality%20support.docx) Discussion on multi-modality support HONOR discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407404](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407404%20Multi-modality%20support.docx) Multi-modality support Nokia discussion NR\_XR\_Ph3-Core

[R2-2407516](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407516%20Primary%20use%20cases%20for%20multi-modality%20support%20in%20RAN.docx) Primary use cases for multi-modality support in RAN III discussion NR\_XR\_Ph3-Core

### 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).

**This agenda item will not be treated during RAN2#127 and no contributions should be submitted for this AI for this meeting.**

### 8.7.4 Scheduling enhancements

Objective: For the UL, Study and if justified, Specify enhancements using delay/deadline information, for support of UL scheduling to enable high XR capacity while meeting delay requirements/avoiding too late PDUs.

Including aspects such as:

* further details of the additional priority for LCH with dealy-critical data
* whether/how to enhance LCP restrictions
* further details of DSR with multiple pairs of remaining time and buffer size, e.g. does PSI need to be included, whether/how is DSR triggering impacted etc.

**LCP restrictions**

[R2-2407354](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407354%20Discussion%20on%20UL%20scheduling%20enhancements.docx) Discussion on Scheduling enhancements HONOR discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3: LCH mapping restrictions configured to LCH can be relaxed in case of the LCH with delay-critical data.

Proposal 4: RAN2 evaluates which LCH mapping restrictions can be relaxed.

[R2-2406741](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406741%20Discussion%20on%20XR%20scheduling%20enhancement.docx) Discussion on XR scheduling enhancements China Telecom discussion

Proposal 2: The new LCP restriction only allows LCH with delay-critical data to have priority over LCH with non-delay critical data in resource allocation.

[R2-2406784](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406784%20XR%20Scheduling%20Enhancements.docx) Scheduling enhancements for Rel-19 XR Samsung discussion Rel-19 NR\_XR\_Ph3-Core

Observation 1. There is little benefit to enhance LCP restriction without RAN1 impact.

Proposal 2. RAN2 to no longer consider the enhancement of the LCP restriction, as one of the candidate solutions for LCP enhancements in Rel-19 XR.

DISCUSSION on whether enhance LCP relaxation or LCP restrictions:

* Xiaomi thinks LCP relaxation can work, but the problem some of these are for URLLC so they cannot be relaxed. For new LCP restriction, dynamic priority can serve the same purpose.
* Fujitsu thinks LCP relaxation can be combined with dynamic prioritization and supports this. New LCP restriction solution has some issues.
* Ericsson thinks that relaxation is complex and brings issues, e.g. it impacts the scheduler in NW. IDT, Nokia, LGE agrees, the NW may just not configure such restrictions.
* QCM thinks there are use cases where enhancements are useful. They are currently used to separate different types of traffic, e.g. voice and data. For delay critical data it makes sense to relax the restrictions.
* Lenovo thinks neither is useful.
* Apple thinks that in case we relax LCP restrictions, the grant may not fit the data. Apple agrees with Samsung.
* Huawei supports relaxation of LCP restrictions to have more transmit opportunities for delay critical data. We can discuss which restrictions can be relaxed and it should be controlled by the NW.
* MTK indicates that the NW will provide proper grant based on DSR.
* RAN2 to no longer consider the enhancement of the LCP restriction, as one of the candidate solutions for LCP enhancements in Rel-19 XR.

**Enhanced DSR contents**

[R2-2407047](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407047%20-%20Discussion%20on%20scheduling%20enhancements.docx) Discussion on scheduling enhancements Ericsson discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1 Network should be able to configure multiple remaining time thresholds for each LCG to report multiple pairs of remaining time and buffer sizes per LCG.

Proposal 2 Any data in front of the queue with longer remaining time than the data behind in the queue should report the lowest remaining time and total buffer size.

Proposal 4 Two importance levels to be included in the DSR and the importance level is indicated in the DSR format using a new I-bit instead of the previous R-bit.

[R2-2407062](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407062%20Scheduling%20enhancements%20for%20XR.docx) Scheduling Enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 7: Include low-importance data ahead of delay critical data in the buffer size calculation for DSR .

[R2-2406989](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406989%20Further%20discussion%20on%20scheduling%20enhancement%20on%20XR.docx) Further discussion on scheduling enhancement on XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 7: RAN2 to agree that PSI is not reported in the DSR.

Proposal 9: Non-delay-critical data is reported in BSR as legacy.

* Network should be able to configure multiple remaining time thresholds for reporting for each LCG to report multiple pairs of remaining time and buffer sizes per LCG.

Proposal 2 Any data in front of the queue with longer remaining time than the data behind in the queue should report the lowest remaining time and total buffer size.

Proposal 7: Include low-importance data ahead of delay critical data in the buffer size calculation for DSR .

DISCUSSION on whether to include (some) non-delay critical data in the DSR:

* QCM thinks the packets in the buffer will always be sorted properly.
* Apple does not think there is a need to discuss this in Rel-19 with multiple reporting thresholds.
* Xiaomi does not see the issue, it can be solved by UE implementation.
* Ericsson indicates we have many solutions assuming the data may not always be ordered and that the UE may sometimes send non-delay critical before delay critical as we agreed not to do intra-LCH prioritization.
* Nokia thinks that maybe non-delay critical term is problematic, the point is we should not have delay critical data blocked by less important data.
* Mediatek agrees with the intention, but how to capture in specs may be a problem.
* Intel thinks that with PSI discard, it does not have to be reported. But if it is not configured, this may be useful.
* Lenovo thinks UE implementation may solve this issue.
* LGE thinks we have a clear definition of delay critical data, so the question is whether we need to update it. LGE does not think we need to do it. It is infrequent case.
* vivo thinks that with multiple thresholds, we may have to report non-delay critical data, depending on how delay critical data is specified considering multiple thresholds.
* LGE thinks that DC data is the data below the shortest DSR threshold.
* Qualcomm thinks we just should improve the granularity of the reported information.
* For enhanced DSR:
	+ - There will be a single triggering threshold, as in Rel-18. FFS whether there are any constraints on how the NW configures DSR triggering and reporting thresholds
		- FFS whether there is any impact on delay critical data definition due to multiple reporting thresholds in the DSR
		- FFS whether to include non-delay critical data ahead of delay critical data in the buffer size calculation for DSR

DISCUSSION on PSI reporting in DSR:

* QCM does not think importance needs to be reported.
* Ericsson thinks that perhaps we need to clarify the above FFS points first, before discussing PSI inclusion in DSR.

[R2-2406594](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406594.docx) Enhanced uplink scheduling for XR Lenovo discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 6: RAN2 should discuss enhancements to the intra-UE prioritization procedure, e.g. considering the remaining delay budget when determining the priority of an UL grant (prioritized/deprioritized UL grant).

DISCUSSION:

* LGE, Xiaomi, vivo thinks additional priority can be considered in intra-UE prioritization.
* QCM thinks this is a stage-3 detail.
* Nokia thinks there may be no spec impact
* FFS whether/how additional priority impacts intra-UE prioritization (can be discussed in stage-3)

[R2-2406256](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406256%20Discussion%20on%20delay-aware%20scheduling.docx) Discussion on delay-aware scheduling Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406269](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406269%20-%20Discussion%20on%20scheduling%20enhancements%20for%20XR.docx) Discussion on scheduling enhancements for XR OPPO discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406371](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406371%20Discussion%20on%20delay-aware%20LCP%20enhancement.docx) Discussion on delay-aware LCP enhancement TCL discussion

[R2-2406436](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406436_Discussion%20on%20scheduling%20enhancement%20for%20XR.docx) Discussion on scheduling enhancement for XR vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406455](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406455_xrSchedulingEnh-v00.docx) Scheduling enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2406474](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406474__LCH-DSR__R19-XR.docx) Scheduling enhancements using delay related information Intel Corporation discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406479](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406479.doc) Discussion on additional priority for delay-critical data SHARP Corporation discussion NR\_XR\_Ph3-Core

[R2-2406548](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406548_xr_lcp_v1.doc) Discussions on enhancement of the LCP for delay-critical data Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406560](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406560%20Consideration%20on%20XR-specific%20scheduling%20enhancement.docx) Consideration on XR-specific scheduling enhancement CATT discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406588](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406588%20Discussion%20on%20scheduling%20enhancements%20of%20XR%20traffic.doc) Discussion on scheduling enhancements of XR traffic Xiaomi Communications discussion

[R2-2406626](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406626_UL%20Scheduling%20enhancements%20for%20XR_v2.docx) UL Scheduling enhancements for XR Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2406677](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406677%20Views%20on%20Delay-Aware%20Operations%20for%20Rel-19%20XR.docx) Views on Delay-Aware Operations for Rel-19 XR Apple discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406761](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406761.doc) Discussion on XR scheduling enhancements Spreadtrum Communications discussion Rel-19

[R2-2406797](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406797%20Delay-aware%20scheduling%20enhancements.docx) Delay-aware scheduling enhancements Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406798](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406798_Considerations%20on%20delay-sensitive%20scheduling%20for%20XR.docx) Considerations on delay-sensitive scheduling for XR NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406858](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406858-Discussion%20on%20DSR%20enhancement.docx) Discussion on DSR enhancement TCL discussion Rel-19

[R2-2406923](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406923%20%20Discussion%20on%20additional%20priority%20for%20delay%20aware%20LCP.docx) Discussion on additional priority for delay aware LCP CANON Research Centre France discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406939](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406939%20Discussion%20on%20delay%20status%20report.docx) Discussion on Delay status report CANON Research Centre France discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407214](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407214%20%28R19%20NR%20XR%20A874_Scheduling%20enhancements%29.docx) Scheduling enhancements for XR InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407274](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407274.docx) Discussion on scheduling enhancements for XR DENSO CORPORATION discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407279](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407279%20Discussion%20on%20Scheduling%20Enhancement%20for%20XR.docx) Discussion on Scheduling Enhancement for XR Meta discussion

[R2-2407384](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407384.docx) Discussion on LCP enhancement for XR Google Ireland Limited discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407392](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407392%20Discussion%20on%20UL%20scheduling%20enhancements.docx) Discussion on UL scheduling enhancements MediaTek Inc. discussion Rel-19

[R2-2407460](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407460%20Discussion%20on%20Scheduling%20enhancement%20for%20XR.docx) Discussion on Scheduling enhancement for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407518](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407518%20Discussion%20on%20XR%20scheduling%20enhancements.docx) Discussion on XR scheduling enhancements III discussion NR\_XR\_Ph3-Core

[R2-2407539](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407539%20Discussion%20on%20XR%20Uplink%20Scheduling.docx) Discussion on UL related Scheduling Enhancements for XR Rakuten Mobile, Inc discussion Rel-19

### 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 and Rx 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.

**Unnecessary retransmissions – Rx and Tx approach clarifications**

[R2-2406400](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406400%20RLC%20enhancements.docx) RLC AM enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1: the RAN2#126 agreement on proper advancing of the window for RX-initiated approach for avoiding unnecessary retransmissions also applies to the TX-initiated approach i.e. “RLC AM is enhanced with a way for the receiver to indicate abandoned SDUs to the transmitter” applies to both RX- and TX-initiated approaches.

Proposal 2: RAN2 acknowledge that in the TX-initiated approach for avoiding unnecessary retransmissions, the mandatory delivery of an SDU is only exchanged for a mandatory delivery of its discard indication.

Proposal 3: For indicating abandoned RLC SDUs from RLC receiver to transmitter, in order that the transmitting PDCP reliably knows how high-numbered PDCP SDUs it can proceed to transmit, 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.

Proposal 4: in the RX-initiated approach for avoiding unnecessary retransmissions, RLC receiver abandons missing SDUs like already done by PDCP, i.e. based on a timer like t-Reordering at PDCP or t-Reassembly in RLC UM.

DISCUSSION on P1:

* OPPO thinks Tx side can advance the window without the enhancement on the Rx side.
* Lenovo agrees with the principle proposed in P1. The receiver needs to send the indication to Tx side for the Tx side to update the window.
* Samsung thinks P1 just means that Tx window will be update as in legacy.
* QCM thinks in Tx approach, Tx side can advance its window automatically.
* OPPO does not see the point of waiting for Rx window to advance before advancing Tx window.
* Huawei supports the idea of keeping the windows aligned, but it can be achieved via different means, not only SR.
* Ericsson also supports the idea, but it can be achieved in different ways.
* Any solution should ensure that windows at Tx side and Rx side are not out of sync. As a baseline, we assume Rx window advances before Tx window advances FFS if for Tx approach window sync needs to be achieved in another way, e.g. advancing Tx window first.

DISCUSISON on P3:

* LGE thinks this problem will happen with proper configurations. Treordering should ensure PDCP window advances properly. LGE suggests to skip the proposal.

DISCUSSION on P4:

* Sony is OK with the proposal, but SR should be more frequent.
* Lenovo is also OK the proposal.
* Huawei would like to consider counter based solution.
* In the RX-initiated approach for avoiding unnecessary retransmissions, RLC receiver abandons missing SDUs like already done by PDCP, i.e. based on a timer.

**Unnecessary retransmissions – Rx vs Tx approach**

[R2-2406481](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406481%20RLC%20AM%20Enhancement.docx) Analysis of RLC AM Enhancements Sharp discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 1 RAN2 to adopt TX-initiated mechanism to avoid unnecessary retransmission.

Proposal 2 Discard Indication from PDCP triggers the indication, when the PDCP SDU is already transmitted in the lower layer (i.e., MAC).

[R2-2406857](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406857-Discussion%20on%20RLC%20AM%20enhancement.docx) Discussion on RLC AM enhancement TCL discussion Rel-19

Proposal 1: It is suggested RAN2 to choose the Rx initiated approach as the baseline to further discuss the solution for Unnecessary retransmissions.

[R2-2407015](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407015.docx) RLC AM enhancement NEC discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3 RAN2 consider independent Rx and Tx approach, where

• Tx side stops to retransmit an obsolete SDUs based on the discard indication as for Tx initiated approach

• Rx side stops to receive an obsolete SDU based on local timer and variable as for Rx initiated approach

DISCUSSION:

* Apple thinks we need to look at two aspects: 1. How to stop unnecessary reTx immediately, 2. How do we sync the windows between Rx and Tx. Tx is better for bullet 1, for bullet 2 we need some signalling from Rx. Apple prefers Tx approach, but combined approach is also acceptable.
* Intel agrees with Apple.
* Lenovo agrees that in terms of latency Tx approach is better. The concern with Rx approach is with dropping the report.
* OPPO also prefers Tx approach to avoid additional gaps in PDCP.
* QCM would like to support NEC’s proposal as it has least impact to specifications.
* Mediatek shares views with Apple, it has less impact on capacity.
* Ericsson is concerned about the impact on specifications.
* Samsung supports Tx approach.
* Xiaomi agrees with Ericsson, if the timer is set based on discard timer than there should be no latency.
* LGE agrees with Xiaomi and Ericsson.
* In addition to Tx and Rx approaches, RAN2 will consider a combined Rx and Tx approach, where
	+ - Tx side stops to retransmit an obsolete SDUs based on the discard indication/a number of retransmissions as for Tx initiated approach
		- Rx side stops to receive an obsolete SDU based on local timer as for Rx initiated approach

**Timely RLC retransmissions**

[R2-2407368](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407368%20Discussion%20on%20details%20of%20RLC%20enhancements%20for%20XR.docx) Discussion on details of RLC enhancements for XR LG Electronics Inc. discussion Rel-19 NR\_XR\_Ph3-Core

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. Retransmission based on enhanced status report is not supported.

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.

[R2-2406561](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406561%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 can be left to gNB implementation, no spec impact.

Proposal 3: For UL XR traffic, the network can configure a new set of shorter value for pollPDU, pollByte, t-PollRetransmit to trigger the polling for timely RLC retransmission. When to apply the shorter value can be further studied.

[R2-2406367](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406367%20-%20Discussion%20on%20RLC%20re-transmission%20related%20enhancements.docx) Discussion on RLC re-transmission related enhancements OPPO discussion Rel-19 NR\_XR\_Ph3-Core

Proposal 3 For the faster polling in RLC AM, RAN2 discuss to rely on proper configuration (the existing value range or introducing smaller values) of related parameters (i.e., pollByte, pollPDU, t-PollRetransmit).

Proposal 4 For autonomous retransmission without feedback, RAN2 to discuss relying on the legacy t-PollRetransmit expiry triggered retransmission with proper t-PollRetransmit configuration.

Proposal 5 For autonomous retransmission without feedback, if new trigger condition besides PollRetransmit expiry is needed, the trigger of autonomous retransmission should be based on the remaining delay budget, e.g., based on a configured remaining delay threshold.

[R2-2406257](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406257%20Discussion%20on%20RLC%20enhancements.docx) Discussion on RLC enhancements Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406364](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406364_KDDI_XR_RLC_Enh.docx) Considerations on RLC re-transmission related enhancements for XR KDDI Corporation discussion

[R2-2406409](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406409.docx) RLC AM retransmission enhancements Xiaomi discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406437](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406437_Discussion%20on%20RLC%20enhancement%20for%20XR.docx) Discussion on RLC enhancement for XR vivo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406443](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406443%20RLC%20Enhancements%20for%20XR.docx) RLC Enhancements for XR Samsung discussion Rel-19

[R2-2406456](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406456%20xrRlcEnh-v00.docx) RLC enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2406475](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406475.docx) RLC AM enhancements for XR traffic Intel Corporation discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406549](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406549%20Discussions%20on%20RLC%20enhancements.docx) Discussions on RLC enhancements Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406601](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406601_Further%20Discussions%20on%20RLC%20AM%20Enhancements.docx) Further Discussions on RLC AM Enhancements Ericsson discussion Rel-19

[R2-2406627](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406627_XR_RLC_v2.docx) RLC AM enhancements Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2406678](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406678%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

[R2-2406734](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406734%20Discussion%20on%20RLC%20AM%20enhancements.docx) Discussion on RLC AM enhancements Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406742](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406742%20Discussion%20on%20RLC%20enhancement%20for%20XR.docx) Discussion on RLC enhancements for XR China Telecom discussion

[R2-2406762](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406762.doc) Discussion on timely RLC retransmission(s) Spreadtrum Communications discussion Rel-19

[R2-2406893](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406893%20AM%20RLC%20enhancement.docx) AM RLC enhancement Lenovo discussion Rel-19

[R2-2406940](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406940%20%20Discussion%20on%20RLC%20AM%20Enhancements.docx) Discussion on RLC AM Enhancements CANON Research Centre France discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406984](file:///D%3A%5C3GPP%5CExtracts%5CR2-2406984.docx) Discussion on the RLC Enhancements for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407215](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407215%20%28R19%20NR%20XR%20A875_RLC_enhancements%29.docx) RLC enhancements for XR InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407280](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407280%20Discussion%20on%20RLC%20AM%20Enhancements%20for%20XR.docx) Discussion on RLC AM Enhancements for XR Meta discussion

[R2-2407355](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407355%20Discussion%20on%20RLC%20enhancements.docx) Discussion on RLC enhancements HONOR discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407391](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407391%20Discussion%20on%20RLC%20enhancements.docx) Discussion on RLC enhancements on small packet delay budget scenario MediaTek Inc. discussion Rel-19

[R2-2407511](file:///D%3A%5C3GPP%5CExtracts%5CR2-2407511%20Discussions%20on%20RLC%20enhancements%20for%20Rel-19%20XR.docx) Discussions on RLC enhancements for Rel-19 XR Futurewei discussion Rel-19 NR\_XR\_Ph3-Core