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:

Started together with the meeting start:

* [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

## 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:\3GPP\Extracts\R2-2407477%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.

### 7.11.2 Corrections

Corrections for all specifications

[R2-2406333](D:\\3GPP\\Extracts\\R2-2406333 Corrections on UE behavior in Multicast MCCH-Less Cell.docx" \o "D:\3GPP\Extracts\R2-2406333 Corrections on UE behavior in Multicast MCCH-Less Cell.docx) 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

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)

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:\3GPP\Extracts\R2-2406507%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"
* 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:\3GPP\Extracts\R2-2406661.doc) Data losing avoiding for multicast reception in RRC\_INACTIVE Sharp discussion

[R2-2406953](file:///D:\3GPP\Extracts\R2-2406953%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

[R2-2407266](file:///D:\3GPP\Extracts\R2-2407266_Discussion%20on%20multicast%20DRX%20to%20support%20NTN%20in%20INACTIVE.docx) Discussion on multicast DRX to support NTN in INACTIVE LG Electronics Inc. discussion NR\_MBS\_enh-Core

*To be removed, will be treated in 7.0.2*

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

[R2-2407474](file:///D:\3GPP\Extracts\R2-2407474%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

[R2-2407526](file:///D:\3GPP\Extracts\R2-2407526%20RedCap%20UE's%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

**MBS TEI18**

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

[R2-2406281](D:\\3GPP\\Extracts\\R2-2406281 Correction on the capabilities on PTM retransmission.docx" \o "D:\3GPP\Extracts\R2-2406281 Correction on the capabilities on PTM retransmission.docx) 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:\3GPP\Extracts\R2-2406282%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

[R2-2406345](file:///D:\3GPP\Extracts\R2-2406345%20(Rel-18)%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

[R2-2407527](file:///D:\3GPP\Extracts\R2-2407527%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

## 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](D:\\3GPP\\Extracts\\R2-2407088 - Correction CR for QoE measurements.docx" \o "D:\3GPP\Extracts\R2-2407088 - Correction CR for QoE measurements.docx) 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

### 7.14.2 Corrections

*Corrections to all specifications.*

[R2-2407001](file:///D:\\3GPP\\Extracts\\R2-2407001%20Correction%20for%20RRC%20spec%20on%20R18%20QoE.doc" \o "D:3GPPExtractsR2-2407001 Correction for RRC spec on R18 QoE.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 (503, Ericsson)
* Change 4 is agreed and will be merged into rapp CR

[R2-2406998](file:///D:\3GPP\Extracts\R2-2406998%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)

DISCUSSION on P3:

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

[R2-2407168](file:///D:\3GPP\Extracts\R2-2407168%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:\3GPP\Extracts\R2-2407336%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:\3GPP\Extracts\R2-2407339.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:\3GPP\Extracts\R2-2407090%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

# 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:\3GPP\Extracts\R2-2406395%20XR%20Work%20Plan.docx) XR Workplan Nokia, Qualcomm (Rapporteurs) Work Plan Rel-19 NR\_XR\_Ph3-Core

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

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

[R2-2406398](file:///D:\3GPP\Extracts\R2-2406398%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:\3GPP\Extracts\R2-2406216_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:\3GPP\Extracts\R2-2406221_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:\3GPP\Extracts\R2-2406222_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:\3GPP\Extracts\R2-2406241_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:\3GPP\Extracts\R2-2406242_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:\3GPP\Extracts\R2-2406254%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:\3GPP\Extracts\R2-2407216%20(R19%20NR%20XR%20A8711_Discussion%20on%20LSs%20from%20SA2%20and%20RAN3).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 (QCM)

Scope: Reply LS to RAN3

Intended outcome: Approved LS to RAN3

Deadline: Friday 2024-08-23

**Reply to SA2 LS on XRM Ph2**

[R2-2406433](file:///D:\3GPP\Extracts\R2-2406433_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:\3GPP\Extracts\R2-2406675%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:

Deadline: Friday 2024-08-23

[R2-2406253](file:///D:\3GPP\Extracts\R2-2406253%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:\3GPP\Extracts\R2-2406255%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:\3GPP\Extracts\R2-2406303%20Discussion%20on%20incoming%20LSs_final.docx) Discussion on incoming LSs Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406399](file:///D:\3GPP\Extracts\R2-2406399%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:\3GPP\Extracts\R2-2406408.docx) Discussion on SA2 and RAN3 LSs for Rel-19 XR Xiaomi discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406434](file:///D:\3GPP\Extracts\R2-2406434_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:\3GPP\Extracts\R2-2406457%20LSin%20Discussion_v00.docx) Discussion on LSs for XR ZTE Corporation, Sanechips discussion

[R2-2406472](file:///D:\3GPP\Extracts\R2-2406472__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:\3GPP\Extracts\R2-2406480%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:\3GPP\Extracts\R2-2406558%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:\3GPP\Extracts\R2-2406566.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:\3GPP\Extracts\R2-2406624_XR%20Reply%20LS.docx) Views on LSs for SA2 and RAN3 Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2406781](file:///D:\3GPP\Extracts\R2-2406781%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:\3GPP\Extracts\R2-2406783%20Discussion%20on%20imcoming%20LSes.docx) Discussion on incoming LSs Samsung discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406892](file:///D:\3GPP\Extracts\R2-2406892%20Discussion%20on%20RAN2%20replies%20to%20LS.docx) Discussion on RAN2 Replies to LS Lenovo discussion Rel-19

[R2-2406913](file:///D:\3GPP\Extracts\R2-2406913_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:\3GPP\Extracts\R2-2407044%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:\3GPP\Extracts\R2-2407276%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:\3GPP\Extracts\R2-2407383%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:\3GPP\Extracts\R2-2406625_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:\3GPP\Extracts\R2-2406916%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.

**How is multi-modal information used**

[R2-2406559](file:///D:\3GPP\Extracts\R2-2406559_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.

[R2-2406589](file:///D:\3GPP\Extracts\R2-2406589%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.

[R2-2407135](file:///D:\3GPP\Extracts\R2-2407135%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.

**DRX enhancements**

[R2-2407045](file:///D:\3GPP\Extracts\R2-2407045%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.

**Scheduling enhancements**

[R2-2406302](file:///D:\3GPP\Extracts\R2-2406302%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.

[R2-2406370](file:///D:\3GPP\Extracts\R2-2406370%20%20Discussion%20on%20Multi-modality%20for%20XR.docx) Discussion on Multi-modality for XR TCL discussion Rel-19

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

[R2-2406463](file:///D:\3GPP\Extracts\R2-2406463_xrMultiModality_v01.docx) Multi-modality assistance information for RAN awareness ZTE Corporation, Sanechips discussion

[R2-2406473](file:///D:\3GPP\Extracts\R2-2406473__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:\3GPP\Extracts\R2-2406525%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:\3GPP\Extracts\R2-2406547_multi-modal.doc) Discussions on Multi-modality XR Fujitsu discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406567](file:///D:\3GPP\Extracts\R2-2406567.docx) Potential enhancements based on multi-modal information awareness NEC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406595](file:///D:\3GPP\Extracts\R2-2406595.docx) Enhancements for support of Multi-Modal XR applications Lenovo discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406662](file:///D:\3GPP\Extracts\R2-2406662.doc) Discussion on Multi-Modality Sharp discussion

[R2-2406676](file:///D:\3GPP\Extracts\R2-2406676%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:\3GPP\Extracts\R2-2406740%20Discussion%20on%20XR%20multi-modality.docx) Discussion on XR multi-modality China Telecom discussion

[R2-2406760](file:///D:\3GPP\Extracts\R2-2406760.doc) Discussion on enhancements for XR Multi-modality Spreadtrum Communications discussion Rel-19

[R2-2406782](file:///D:\3GPP\Extracts\R2-2406782%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:\3GPP\Extracts\R2-2406864%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:\3GPP\Extracts\R2-2406914_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:\3GPP\Extracts\R2-2406988%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:\3GPP\Extracts\R2-2407213%20(R19%20NR%20XR%20A872_Multi%20modality%20support).docx) Multi-modality support for XR InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407225](file:///D:\3GPP\Extracts\R2-2407225%20Discussion%20on%20multi-modality.docx) Discussion on multi-modality MediaTek Inc. discussion Rel-19

[R2-2407277](file:///D:\3GPP\Extracts\R2-2407277%20Discussion%20on%20Multi-Modality%20XR.docx) Discussion on Multi-Modality XR Meta discussion

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

[R2-2407404](file:///D:\3GPP\Extracts\R2-2407404%20Multi-modality%20support.docx) Multi-modality support Nokia discussion NR\_XR\_Ph3-Core

[R2-2407516](file:///D:\3GPP\Extracts\R2-2407516%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:\3GPP\Extracts\R2-2407354%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:\3GPP\Extracts\R2-2406741%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:\3GPP\Extracts\R2-2406784%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:\3GPP\Extracts\R2-2407047%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:\3GPP\Extracts\R2-2407062%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:\3GPP\Extracts\R2-2406989%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:\3GPP\Extracts\R2-2406594.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:\3GPP\Extracts\R2-2406256%20Discussion%20on%20delay-aware%20scheduling.docx) Discussion on delay-aware scheduling Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406269](file:///D:\3GPP\Extracts\R2-2406269%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:\3GPP\Extracts\R2-2406371%20Discussion%20on%20delay-aware%20LCP%20enhancement.docx) Discussion on delay-aware LCP enhancement TCL discussion

[R2-2406436](file:///D:\3GPP\Extracts\R2-2406436_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:\3GPP\Extracts\R2-2406455_xrSchedulingEnh-v00.docx) Scheduling enhancements for XR ZTE Corporation, Sanechips discussion

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

[R2-2406479](file:///D:\3GPP\Extracts\R2-2406479.doc) Discussion on additional priority for delay-critical data SHARP Corporation discussion NR\_XR\_Ph3-Core

[R2-2406548](file:///D:\3GPP\Extracts\R2-2406548_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:\3GPP\Extracts\R2-2406560%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:\3GPP\Extracts\R2-2406588%20Discussion%20on%20scheduling%20enhancements%20of%20XR%20traffic.doc) Discussion on scheduling enhancements of XR traffic Xiaomi Communications discussion

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

[R2-2406677](file:///D:\3GPP\Extracts\R2-2406677%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:\3GPP\Extracts\R2-2406761.doc) Discussion on XR scheduling enhancements Spreadtrum Communications discussion Rel-19

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

[R2-2406798](file:///D:\3GPP\Extracts\R2-2406798_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:\3GPP\Extracts\R2-2406858-Discussion%20on%20DSR%20enhancement.docx) Discussion on DSR enhancement TCL discussion Rel-19

[R2-2406923](file:///D:\3GPP\Extracts\R2-2406923%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:\3GPP\Extracts\R2-2406939%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:\3GPP\Extracts\R2-2407214%20(R19%20NR%20XR%20A874_Scheduling%20enhancements).docx) Scheduling enhancements for XR InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407274](file:///D:\3GPP\Extracts\R2-2407274.docx) Discussion on scheduling enhancements for XR DENSO CORPORATION discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407279](file:///D:\3GPP\Extracts\R2-2407279%20Discussion%20on%20Scheduling%20Enhancement%20for%20XR.docx) Discussion on Scheduling Enhancement for XR Meta discussion

[R2-2407384](file:///D:\3GPP\Extracts\R2-2407384.docx) Discussion on LCP enhancement for XR Google Ireland Limited discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407392](file:///D:\3GPP\Extracts\R2-2407392%20Discussion%20on%20UL%20scheduling%20enhancements.docx) Discussion on UL scheduling enhancements MediaTek Inc. discussion Rel-19

[R2-2407460](file:///D:\3GPP\Extracts\R2-2407460%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:\3GPP\Extracts\R2-2407518%20Discussion%20on%20XR%20scheduling%20enhancements.docx) Discussion on XR scheduling enhancements III discussion NR\_XR\_Ph3-Core

[R2-2407539](file:///D:\3GPP\Extracts\R2-2407539%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:\3GPP\Extracts\R2-2406400%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.

**Unnecessary retransmissions – Rx vs Tx approach**

[R2-2406481](file:///D:\3GPP\Extracts\R2-2406481%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:\3GPP\Extracts\R2-2406857-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:\3GPP\Extracts\R2-2407015.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

**Timely RLC retransmissions**

[R2-2407368](file:///D:\3GPP\Extracts\R2-2407368%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:\3GPP\Extracts\R2-2406561%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:\3GPP\Extracts\R2-2406367%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:\3GPP\Extracts\R2-2406257%20Discussion%20on%20RLC%20enhancements.docx) Discussion on RLC enhancements Qualcomm Incorporated discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406364](file:///D:\3GPP\Extracts\R2-2406364_KDDI_XR_RLC_Enh.docx) Considerations on RLC re-transmission related enhancements for XR KDDI Corporation discussion

[R2-2406409](file:///D:\3GPP\Extracts\R2-2406409.docx) RLC AM retransmission enhancements Xiaomi discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406437](file:///D:\3GPP\Extracts\R2-2406437_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:\3GPP\Extracts\R2-2406443%20RLC%20Enhancements%20for%20XR.docx) RLC Enhancements for XR Samsung discussion Rel-19

[R2-2406456](file:///D:\3GPP\Extracts\R2-2406456%20xrRlcEnh-v00.docx) RLC enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2406475](file:///D:\3GPP\Extracts\R2-2406475.docx) RLC AM enhancements for XR traffic Intel Corporation discussion Rel-19 NR\_XR\_Ph3-Core

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

[R2-2406601](file:///D:\3GPP\Extracts\R2-2406601_Further%20Discussions%20on%20RLC%20AM%20Enhancements.docx) Further Discussions on RLC AM Enhancements Ericsson discussion Rel-19

[R2-2406627](file:///D:\3GPP\Extracts\R2-2406627_XR_RLC_v2.docx) RLC AM enhancements Sony discussion Rel-19 NR\_XR\_Ph3

[R2-2406678](file:///D:\3GPP\Extracts\R2-2406678%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:\3GPP\Extracts\R2-2406734%20Discussion%20on%20RLC%20AM%20enhancements.docx) Discussion on RLC AM enhancements Huawei, HiSilicon discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2406742](file:///D:\3GPP\Extracts\R2-2406742%20Discussion%20on%20RLC%20enhancement%20for%20XR.docx) Discussion on RLC enhancements for XR China Telecom discussion

[R2-2406762](file:///D:\3GPP\Extracts\R2-2406762.doc) Discussion on timely RLC retransmission(s) Spreadtrum Communications discussion Rel-19

[R2-2406893](file:///D:\3GPP\Extracts\R2-2406893%20AM%20RLC%20enhancement.docx) AM RLC enhancement Lenovo discussion Rel-19

[R2-2406940](file:///D:\3GPP\Extracts\R2-2406940%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:\3GPP\Extracts\R2-2406984.docx) Discussion on the RLC Enhancements for XR CMCC discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407215](file:///D:\3GPP\Extracts\R2-2407215%20(R19%20NR%20XR%20A875_RLC_enhancements).docx) RLC enhancements for XR InterDigital discussion Rel-19 NR\_XR\_Ph3-Core

[R2-2407280](file:///D:\3GPP\Extracts\R2-2407280%20Discussion%20on%20RLC%20AM%20Enhancements%20for%20XR.docx) Discussion on RLC AM Enhancements for XR Meta discussion

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

[R2-2407391](file:///D:\3GPP\Extracts\R2-2407391%20Discussion%20on%20RLC%20enhancements.docx) Discussion on RLC enhancements on small packet delay budget scenario MediaTek Inc. discussion Rel-19

[R2-2407511](file:///D:\3GPP\Extracts\R2-2407511%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