3GPP TSG-RAN WG2 Meeting #125bis draft R2-2403732

Changsha, China, April 15th – 19th, 2024

Source: RAN2 Vice Chairman (CATT)

Title: Report from session on R18 MIMOevo, R18 MUSIM, and R19 LP-WUS

## Status of At-Meeting Email Discussions

This subclause is not an Agenda Item. It contains a running summary of the email discussions assigned to take place during the meeting weeks.

* [AT125bis][200] Organizational – MIMOevo, MUSIM, and LPWUS (RAN2 VC)

Scope: a) Share plans and list of ongoing email discussions for the related sessions, and b) Share meetings notes and agreements for review and endorsement

## 7.17 Dual Transmission Reception (Tx Rx) Multi-SIM for NR

(NR\_DualTxRx\_MUSIM-Core; leading WG: RAN2; REL-18; WID: [RP-233071](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_100/Docs/RP-231461.zip))

Time budget: 0 TU

Tdoc Limitation: 2 tdocs

### 7.17.1 Organizational

Rapporteur input, i.e., WI/Spec Rapporteur(s) are invited to provide updated open issues lists that need to be handled.

Incoming LS.

Corrections to TS 38.300.

R2-2402483 RILs\_conclusion\_MUSIM vivo(Rapporteur) other Rel-18 NR\_DualTxRx\_MUSIM-Core Late

*PropAgree: Z101, S861, Z104, Z105, Z106, Z113, Z109, H102, H103, Z111, Z110, Z112, H107, Z114, Z117, Z119, Z118, Z108, Z120, Z121, Z122, Z123, Z124, Z125*

*PropReject: N095, H100, H101*

*ToDo: L012, S863, Z102, Z103, Z116-1, S860, Z116-2, N094, H104, H105, H106, S862, H108, H109, S854*

Discussions:

- Samsung wants to postpone Z117, since it may impact multiple WI.

- ZTE think Z115 should also be discussed together with Z117.

- Xiaomi think N095 is agreeable. Vivo, Samsung, and ZTE do not think it is agreeable for now, think this has already be discussed. Ericsson think wording ‘may not’ is not good.

* RILs with status PropAgree are agreed, expect for that Z117 is postponed.
* RILs with status PropReject are rejected.

R2-2402484 Correction on NR MUSIM enhancements vivo(Rapporteur) CR Rel-18 38.331 18.1.0 4664 - F NR\_DualTxRx\_MUSIM-Core Late

* Noted, will be updated and reviewed in the post meeting email discussion.
* [Post125bis][203][MUSIM] CR for TS 38.331 (vivo)

Scope: Update and review the CR for TS 38.331, update the RIL list based on agreements in this meeting.

Intended outcome: endorsed CR and updated RIL list

Deadline: Short

### 7.17.2 RRC

Corrections to RRC (other than UE capabilties, which should be submitted to 7.17.3).

Discussions and propsoals on the RRC open issues if listed by Rapporteur(s) or triggered by LSs, etc..

R2-2402313 [S854] Discussion on MUSIM remaining issues CATT discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

- Samsung think this is very simple and useful. OPPO wonders if this can be solved by NW implementation.

* S854 is rejected.

R2-2403617 [S854][S862][S863] RILs on MUSIM Samsung discussion Late

S862

- ZTE agree with the RIL.

- HW agree with the intention of this proposal, but has different view in terms of how to modify, wants to discuss wording further.

* S862 is agreed, exact wording in the changes can be further discussed.

S863

- ZTE has Z102 and think it can solve the issue properly.

- OPPO fine with this proposal, but think P3 is sufficient. ZTE also think P3 is ok.

* P3 is agreed, exact wording can be further checked.

R2-2403562 [S860] Discussion on early indication of MUSIM temporary capability restriction in RRCReestablishmentComplete Samsung, Intel Corporation, CATT, Xiaomi, Qualcomm, Apple, China Telecom, NEC, vivo, Huawei, HiSilicon discussion Rel-18 38.331 NR\_DualTxRx\_MUSIM-Core

* Introduce musim-CapRestrictionInd in RRCReestablishmentComplete message.

R2-2402485 Discussion on the capability restriction during RRC re-establishment vivo discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

* Noted

R2-2403728 [H104][H105][H106][H108][H109] Discussion on MUSIM RILs Huawei, HiSilicon discussion Rel-18

H104

- QC, Samsung support proposal in H104. Xiaomi think we can just use per band indication. Samsung think per FR is fine, but problem is whether per CG is really needed.

- Xiaomi and QC think it is better the keep the current report and add the per FR/CG part separately.

* Included in offline discussion

H105, H106

- Samsung agree.

* H105, H106 are agreed.

H108, H109

- vivo think this can already be handled by NW, thus not sure whether it is needed. Samsung think O2 is clear and useful to clarify the NW handling. Vivo think there are two different possible NW hanldings.

- Ericsson think this is specifically for the UAI case and if we change this then there will be many places to change?

* Included in offline

R2-2403522 [L012] Wait timer issue when performing Handover LG Electronics Inc. discussion Rel-18 38.331 NR\_DualTxRx\_MUSIM-Core

- OPPO and Samsung think there is no issue with the current spec.

- Nokia think this is rare case.

* Included in offline

R2-2403739 [Z116][Z102][S863] Consideration on the MUSIM UAI Reporting ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

Z116

- Samsung do not see a need to change. Vivo also think so.

* Included in offline

Z102, S863

- HW do not like O1 since it changes too much. Samsung think O2 is better.

* Z102 and S863 are agreed. Option 2 is agreed, and exact wording of the changes can be further checked.

R2-2403147 Additional capability restrictions related to measurement gaps Nokia discussion

N094

- vivo think this is ok. Samsung think this is helpful.

- xiaomi think we need more discussion on this.

Chair: companies can check further and we can discuss in the next meeting.

R2-2402451 Further discussion on open Issue#8 about reconfiguration failure for MUSIM Huawei, HiSilicon, vivo, DENSO CORPORATION, China Telecom, Qualcomm Incorporated, Samsung discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

- Nokia think this is not common case.

- Intel ok with the intention, but wording needs checking.

- Ericsson also think a note is useful.

- ZTE asks what if the wait timer is still running. Vivo thinks UE just wait. Samsung think the wait timer is clear and we do not need to change anything for it. HW share this view.

* P1 is agreed. Detailed wording can be further discussed.

R2-2403324 Open issues on MUSIM Band restrictions Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

- QC disagree P1 and think we already discuss this. For the rest QC think it is already clear and no strong need to change. Vivo, xiaomi share this view.

- CATT understand the intention of P1-P4 but think it is sufficient to capture in notes. CATT think restriction in P5 is not needed.

- OPPO think P4 is not clear.

- xiaomi open to disucss P2-P5.

Chair: companies can discuss offline to clarify the intention of the proposals. Can check in the CB session to see whether there is support for the proposals.

* Postpone

R2-2403325 Discussion on bandEntryIndex at handover Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

- Samsung, vivo think this info is already included so no need to further change.

- Ericsson think it is beneficial to include.

* Noted

R2-2402968 [H104][H108][H109] Discussion on MUSIM RILs Huawei, HiSilicon discussion Rel-18 Late

=> Revised in R2-2403728

R2-2403142 Discussion on security issue for early indication Huawei, HiSilicon discussion Rel-18

- QC is ok with the proposal, even though it is not necessarily for security reason.

- vivo, samsung think this has been discussed multiple times and also think there is no security issue, so not needed. ZTE also doubt.

* Noted

R2-2403146 Remaining open issues for Dual TX/TX MUSIM Operation Nokia discussion

- QC think proposals other than P1 are not needed. CATT think P1 is not needed, and it is up to NW implementation whether to configure DAPS or not.

- Xiaomi think P1 can be discussed further.

Chair: P1 can be further checked in CB.

* Noted

Conclusion in CB:

- vivo suggests to discuss based on TP if possible.

* P1 is postponed

R2-2403150 Corrections on need for gap for MUSIM purpose OPPO discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2403262 Dependency of Musim-NeedForGaps with Nr-NeedForGap-Reporting capability Samsung discussion

- vivo do not want to couple these two capabilities.

- QC think the proposal make senses and think wording can be discussed further.

* included in offline

R2-2403151 Corrections on the feature for keeping MUSIM gaps when collision OPPO discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

- QC and vivo support these changes.

- Samsung think it is not needed.

* Included in offline

R2-2403428 Consideration on the UAI Processing during Handover ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

* Noted

R2-2403429 Consideration on the Fallback Relationship for the Affected Band Combinations ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

- QC think we already agree so no need to change.

- HW agree with all the proposals.

- vivo do not agree with the proposals, and think for affected bands this complicates the procedure.

* included in offline

Discussion in CB session:

R2-2403560 No capability restriction in first UAI after early indication Samsung, Huawei, HiSilicon, ZTE Corporation, Sanechips discussion

- Samsung believe this requires further discussion.

- QC support.

- Ericsson think it is a corner case, but ok to have it.

* UE sends UAI with empty *musim-CapRestriction* to indicate the removal of temporary capability restrictions reported in early indication, if there is no restriction at the time of reception of musim-CapabilityRestrictionConfig.
* Text Proposal in TP1 is taken as baseline. Detailes can be discussed further.

R2-2403430 [RIL-Z116] Consideration on the MUSIM UAI Setting ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

=> Revised in R2-2403739

R2-2403715 [Z102][S863] Consideration on the musim-MaxCC Reporting ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

=> Withdrawn

* [AT125bis][201][MUSIM] Offline discussion on the remaining RILs and other issues (vivo)

Scope: Discuss the remaining RILs and other issues for MUSIM

 Intended outcome: Agreeable proposal for handling the RILs or other critical open issues if any, summary in R2-2403741

 Deadline: before Wednesday CB session

R2-2403741 [AT125bis][201][MUSIM] Offline discussion on the remaining RILs and other issues (vivo) discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

H104

* RIL H104 is agreed, as baseline maximum number of CCs reported per-FR level.
* Option 2, i.e., “add additional optional values for maximum number of CCs reported per-FR level” is baseline. Details can be discussed during CR update. FFS whether to make some restriction on how whether UE report per FRx/UE only or UE can report both at the same time.

H108, H109

* RIL H108 is agreed with rewording of the corresponding TP in R2-2403728 and H109 reject. The TP “The field considers measurement gap requirement information last reported by the UE in RRCReconfigurationComplete message, RRCResumeComplete message and UEAssistanceInformation message for MUSIM, if any.” is taken as baseline with detail clarification in the field description for needForGapsInfoNR in inter-node message.

L012

* RIL L012 is rejected.Whether to move the text in table 7.1.1. (or just reflect it) to RRC Reconfig procedure part can be further investigated.

Z116

* Intention of RIL Z116 is agreeable, will discuss further how to update the procedure part (i.e., do not change the ASN.1 part).

Dependency of Musim-NeedForGaps with Nr-NeedForGap

* Option 1, i.e., updating musim-CapabilityRestriction-r18 IE in TS38.306 is Way Forward. The following TP is taken as baseline: “For a UE supporting nr-NeedForGap-Reporting-r16, this field also indicates UE supports musim-NeedForGapsInfoNR-r18 as defined in TS 38.331 [9].”
* CR Rapporteur of MUSIM UE capabilities for 38.306 will be submitted in the next meeting.

Keeping MUSIM gaps when collision

* P6 is agreed.

Fallback Relationship for the Affected Band Combinations

* To capture the description on how UE report musim-AffectedBandsList so that NW can fully understand UE. The following TP is taken as baseline: “UE explicitly indicates each band and each combination of bands to be affected. Network should take these capability restrictions also for the band combinations that contain these bands and/or combination of bands.” Detail TP will be discussed in CR update.

### 7.17.3 Other

UE capabilities related corrections.

Corrections to TS 37.340.

Other issues if not covered by the previous agenda items.

## 7.20 NR MIMO evolution

(NR\_MIMO\_evo\_DL\_UL-Core; leading WG: RAN1; REL-18; WID: [RP-233028](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_98e/Docs/RP-223276.zip))

Time budget: 0TU

Tdoc Limitation: 2 tdoc

### 7.20.1 Organizational

Rapporteur input, i.e., WI/Spec Rapporteur(s) are invited to provide updated open issues lists that need to be handled.

Incoming LS.

Stage 2 corrections

R2-2402801 MAC open issue list for MIMO evolution Samsung, NTT DOCOMO, INC. discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* Noted

R2-2403729 NR RIL List Q2 Phase 1 MIMO (v102) Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core Late

*PropAgree: C517, H148, H149, H151-1 (Should be moved to a new "TCI-inDCI field descriptions" table.), H151-2 (Could be replaced with "Used as specified in" as it does not really say anything.), C512, C513, C514, S959, H154, H155, C515, C516, C506, C508, C518, C519*

*PropDisagree: H150, H153, N110*

*ToDo: H152, S958, S956, S957, S952, S953, E229, E228, S955, S954*

- HW think C516 has no TP and not clear what to do. CATT think both C515/516 can be discussed based on contribution.

* RILs with stauts PropAgree are agreed
* H150 is rejected. H153 and N110 are moved to ToDo.
* [Post125bis][204][MIMOevo] CR for TS 38.321 (Samsung)

Scope: Update and review the CR for TS 38.321.

Intended outcome: endorsed CR

Deadline: Short

* [Post125bis][205][MIMOevo] CR for TS 38.331 (Ericsson)

Scope: Update and review the CR for TS 38.331, update the RIL list based on agreements in this meeting.

Intended outcome: endorsed CR and updated RIL list

Deadline: Short

### 7.20.2 MAC

Corrections to MAC.

Discussions and propsoals on the open issues if listed by Rapporteur(s) or triggered by LSs, ect.

R2-2403376 Discussion On Remaining Issues on mTRP with 2TA ZTE, Samsung, CATT, OPPO discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

- Xiaomi think we can focus on P4. Xiaomi think O1 is not working, and think that requires R4 work.

- Nokia think O1 can work with proper NW implementation, and fine with either option. LG E has similar view, and think NW should handle UEs with or without 2TA configured. Ericsson agree as well, and think we can just go with O1. Samsung agree.

- Samsung, ZTE and LG E think this does not impact R4.

- QC think O2 is simpler. OPPO agree.

- ZTE think O2 is with less specification effort.

- Ericsson think O2 is a restriction and it is not necessary.

* Clarify in the field description of cg-SDT-TimeAlignmentTime and in the procedural text: cg-SDT-TimeAlignmentTime is associated with the PTAG indicated by tag-Id (i.e., ID=0). TP in 5.1 of R2-2403376 is taken as baseline.

Discussions in CB session:

- Samsung think the agreement above also impacts RRC.

R2-2402802 MAC Remaining issues on MIMO Samsung discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

P1

- QC support P1.

* When lch-basedPrioritization is configured, the existing rule for handling the overlapping PUSCH (i.e., between CG and DG, and between DG and DG) is applied for each coresetPoolIndex. Adopt the TP in 5.4.1 as baseline.

P2

- LG E think P2’s intention is OK, but think there is sth missing in the R1 spec. QC also think we can check with R1.

- ZTE think we need to further discuss related issue in Rel-17, and do not want to agree this for now.

Chair: companies are encouraged to check internally with their R1 people, to see if this needs some guidance from R1.

* P2 is postponed.

P3

- LG E agree with the intention but want to check wording.

* Correct the field description of PH k in Enhanced Single/Multiple Entry PHR for multiple TRP STx2P MAC CE, in order to align with R1 spec. Exact changes can be further checked.

R2-2403292 Correction on RA for 2TA Huawei, HiSilicon CR Rel-18 38.321 18.1.0 1818 - F NR\_MIMO\_evo\_DL\_UL-Core

* Intention is agreeable. Will be taken into account in the MAC rapp’s CR.

R2-2403375 Cosideration On PHR and PHR MA CE for STxMP ZTE Corporation, Sanechips discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* Postponed

R2-2402537 Discussion on CG-SDT Related TAT Handling with Two TAs CATT discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2402820 Discussion on co-existence of SDT and the configuration of 2 PTAGs OPPO discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2402842 Remaining issue on STx2P PHR LG Electronics Inc. discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2402843 Remaining issues on SDT and 2-PTAGs LG Electronics Inc. discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2402940 Discussion on remaining issues of NR MIMO evo Qualcomm Incorporated discussion NR\_MIMO\_evo\_DL\_UL-Core

R2-2403084 Correction on multi-TRP STx2P PHR MAC CE Nokia discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

### 7.20.3 RRC

Corrections to RRC, RILs.

Discussions and propsoals on the open issues if listed by Rapporteur(s) or triggered by LSs, ect..

R2-2402288 Discussion on CBRS configuration for CJT NEC discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

- Samsung think this issue was discussed and rejected in the last meeting. CATT agree.

R2-2402804 RIL S958, S959 on codebook CBSR Samsung, Xiaomi, Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

- HW think it is better to specify the length via ASN.1, rather than in the FD.

- ZTE and CATT support intention of Samsung proposal. CATT support Option 1.

?? Separate n1-n2 and CBSR for Rel-18 codebook-Config, and adopt option 1 (specify CBSR bitmap length in field description) as baseline.

* Included in offline

R2-2402538 [C506][C508][C512][C513][C514][C515][C516][C519] RRC Corrections for MIMO CATT, Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* RILs are already agreed, exact wording can be further discussed in offline if needed

R2-2402803 RIL S952, S953, S954, S955, S956, S957, C515, C516, E228, E229 Samsung discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

- HW agree with the proposals and think we can even remove more (e.g., for S955).

- CATT think it is useful to have some description in RRC.

- Ericsson agree from high level that we can simply.

* Intention of S952, S953, S954, S955, S956, S957 are agreeable, exact wording will be checked in offline.

R2-2403134 [N110] Correction on Unified TCI operation Nokia discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

- CATT agree with this change.

Chair: will check in CB

Discussions in CB:

- Nokia think this is now agreeable after offline.

- HW wonders whether the changes are for R17 or 18.

* N110 is agreed. The definition of the condition FollowUTCI associated with *applyIndicatedTCI-State-r18* in *PDCCH-ConfigCommon* is updated to indicate that the field *FollowUTCI* is absent in an mDCI configuration.

R2-2403222 Remaining aspects on RRC for MIMOevo, E228, E229, C515, C516 Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

- CATT agree with the intention, but do not think it is good to use the wording ‘active bwp’. CATT think we can just refer to R1 spec if there is confusion.

* Included in offline

R2-2403293 [H152][H153] RRC corrections for MIMO Huawei, HiSilicon discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

P1:

- CATT agree with the intention of P1, wording requires further checking.

* P1 is agreed, exact wording can be further checked.

P2:

- CATT think we do not combine these two. ZTE want to understand what is the issue if we configure these two together.

- Samsung understand the issue and think currently there is no restriction for NW to configure different PCI. HW also do not think such restriction is needed.

* P2 and P3 are included in offline

P4:

- CATT disagree.

* [AT125bis][202][MIMOevo] Offline discussion on the remaining RILs and other issues (Ericsson)

Scope: Discuss the remaining RILs and other issues for MIMOevo

 Intended outcome: Agreeable proposal for handling the RILs or other critical open issues, summary in R2-2403742

 Deadline: before Wednesday CB session

R2-2403742 Summary of offline discussion [202] Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

S958, S959

- Samsung think S959 was already agreed but the changes were somehow dropped.

* S958 is agreed. Adopt the alternative option which aligns with existing design (in Appendix). We also make CBSR configuration optional in both type 2 CJT and type 2 Doppler codebooks and update the field description(s).

S952, S953, S954

* RILs S952, S953, S954 are agreed. Remove “If more than one value for the field coresetPoolIndex is configured in IE controlResourceSet for the BWP, the value 'first' corresponds to the "indicated" joint/UL TCI states specific to coresetPoolIndex value 0 and the value 'second' correspond to the coresetPoolIndex value 1, respectively. In this case, network does not configure the value 'both'.” from corresponding applyIndicatedTCI-state field descriptions.

S955

* S955 is agreed. Agree to remove text as proposed in S955 but do not add details (i.e., only refer to R1 spec)

S956, S957

* S956, S957 are agreed.

E228, E229

* E228, E229 are rejected. UL / DL dependency is captured in RAN1 specifications and we remove corresponding text from field descriptions.

H153

* H153 is agreed, proposed wording agreed as baseline according to the text proposal, can be further updated during RRC review if there is need.

*Proposal 7 Discuss how to progress with H152, e.g. whether 2TA and ICBM are allowed to be configured for the same serving cell / UL BWP.*

- HW think such combination is allowed, and think no more changes are needed.

- Xiaomi think some changes may be needed.

- QC think R1 may not consider all the possible cases, and do not think these two can be configured together. Ericsson agree.

- CATT also think R1 has not discussed such combination, but do not see any issue anyway, and think NW can configure different PCI for each TRP separately. Samsung agree there is no need for change for now and think we can discuss based on proposals.

R2-2403743 Draft MIMO CR capturing outcome of offline [202] Ericsson Rel-18 38.331 NR\_MIMO\_evo\_DL\_UL-Core

- Ericsson think this CR can be used as baseline for further update.

* Noted, will be updated and reviewed in the post meeting email discussion.

R2-2403988 TP to remove unnecessary ToReleaseList Huawei, HiSilicon discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* Postpone

## 8.4 Low-power wake-up signal and receiver for NR (LP-WUS WUR)

(NR\_LPWUS-Core; leading WG: RAN1; REL-19; WID: [RP-240801](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_103/Docs/RP-240801.zip))

Time budget: 0.5 TU

Tdoc Limitation: 2 tdocs

### 8.4.1 Organizational

LS, Rapporteur input, including workplan, etc.

R2-2402635 Work plan for Rel-19 WI on LP-WUSWUR vivo (Rapporteur) discussion Rel-19 NR\_LPWUS-Core

- Ericsson want to know what is the intention of ‘SI reception.’ Vivo think this relates to how UE get the configuration and apply, and has contribution on that.

- Ericsson observe some overlapping of the work plan across different WGs. Vivo think R1 already started their work, e.g., on the connected state. Vivo think R2 disc is also necessary before final decision.

* Noted

### 8.4.2 Procedure and configuration of LP-WUS in RRC\_IDLE INACTIVE

Procedure and configuration of LP-WUS indicating paging monitoring triggered by LP-WUS, including at least configuration, sub-grouping and entry/exit condition for LP-WUS monitoring

R2-2402320 Discussion on LP-WUS/WUR for RRC IDLE/INACTIVE state KT Corp. discussion Rel-19 NR\_LPWUS

* Noted

R2-2403332 Discussion on Procedure and configuration in RRC\_IDLE/INACTIVE NTT DOCOMO INC.. discussion Rel-19 NR\_LPWUS-Core

*Proposal 1: Configuration for LP-WUS is broadcasted in SIB as baseline.*

*Proposal 2: RAN2 can have further discussion for UE dedicated condition for LP-WUS. And if needed, UE dedicated configuration for LP-WUS will be considered.*

*Proposal 3: Subgrouping method for PEI in Rel-17 can be also applied to LP-WUS.*

*Proposal 4: For UE\_ID based subgrouping, it is better to separate LP-WUS UE to reduce false wakeup rate.*

*Proposal 5: Coverage of LP-WUS should be considered for entry/exit condition for LP-WUS monitoring.*

*Proposal 6: LR measurement can be used for both entry/exit condition for LP-WUS monitoring.*

*Proposal 7: MR measurement can be used for entry condition for LP-WUS monitoring.*

R2-2403272 LP-WUS in IDLE and INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

*Proposal 1: NW can configure in the system information entry/exit condition for LP-WUS monitoring.*

*Proposal 2: The UE starts LP-WUS monitoring when LP-WUS monitoring entry condition (better than threshold) is fulfilled and the UE stops LP-WUS monitoring when LP-WUS monitoring exit condition (worse than threshold) is fulfilled.*

*Proposal 3: LP-WUS monitoring entry and exit condition is related to LP-WUS quality.*

*Proposal 4: LP-WUS monitoring entry condition is evaluated based on MR and/or LR measurement.*

*Proposal 5: LP-WUS monitoring exit condition is evaluated based on LR measurement.*

*Proposal 6: RAN2 assumes that RAN1 defines LR measurements quantities.*

*Proposal 7: UE monitors the legacy PEI and/or PO after receiving LP-WUS indicating wake-up and no changes to the paging occasion to be monitored are supported.*

R2-2403698 Procedure and configuration of LP-WUS in RRC\_IDLE and RRC\_INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

*Proposal 1: The LP-WUS configuration for IDLE/INACTIVE state is provided via system information.*

*Proposal 2: The LP-WUS configuration in SIB at least includes the following information:*

*- LP-SS configuration*

*- LP-WUS configuration*

*- Entry/exit condition for LP-WUS monitoring.*

*Proposal 3: For LP-WUS triggered paging procedure, UE monitors legacy PO after receiving LP-WUS indicating wake-up, i.e. whether to monitor PEI is up to UE implementation.*

*Proposal 4: For LP-WUS triggered paging procedure, NW configures the time offset between the LP-WUS and the start timepoint for the indicated paging reception.*

*Proposal 5: IDLE/INACTIVE UE is not required to monitor LP-WUS after receiving the wake-up LP-WUS.*

*Proposal 6: It’s up to UE implementation when to switch on MR for paging reception after receiving the wake-up LP-WUS.*

*Proposal 7: LP-WUS triggered paging procedure is activated/deactivated based on serving cell measurement.*

*- If the serving cell quality is better than threshold#1, UE enables LP-WUS triggered paging procedure, i.e. using LP-WUS to trigger the paging reception. (entry condition)*

*- If the serving cell quality is worse than threshold#2, UE disables the LP-WUS triggered paging procedure, i.e. apply the paging procedure in legacy. (exit condition)*

*Proposal 7a: For the entry condition for using LP-WUS, the serving cell measurement is based on MR.*

*Proposal 7b: For the exit condition for using LP-WUS, the serving cell measurement is at least based on LR.*

Discussions on ‘configuration of LPWUS’

- Ericsson ask what is the use case to provide configuration in dedicated signalling. DCM think this can be discussed. ZTE think there is some benefit in terms of latency. NEC think dedicated signalling can be used to provide different config to UEs for entry/exit conditions. Sony think it is useful to provide in RRCRelease. QC think such dedicated config is not needed. Samsung do not see a need for dedicated signalling. HW think dedicated signalling is not working due to UE’s mobility. CATT also want to exclude dedicated signalling.

- Ericsson generally agree with Apple P1 and P2. Lenovo, OPPO, HW, Nokia agree as well.

- vivo suggest we first conclude on the agreeable part and put the detailed content of the configuration FFS. Vivo fine with FFS on using dedicated signalling.

- CATT think detailed content in the configuration can wait for R1 progress.

* The LP-WUS related configuration for IDLE/INACTIVE state is provided via system information. FFS if dedicated configuration is needed.
* Working assumption: the LP-WUS configuration in SIB at least includes the following information:

- LP-SS configuration

- LP-WUS configuration

- FFS on Entry/exit condition for LP-WUS monitoring

Discussions on ‘entry/exit conditions’ based on Nokia proposal 2-5

- Samsung not sure if such conditions are needed, e.g., when MR/LR have the same coverage performance. Vivo think coverage of LR is similar as msg3, but in real world there might be some difference. OPPO think some input from R1 is needed first, before we discuss quality related conditions. ZTE think we can ask R1 (e.g., the target performance). Lenovo think DL/UL coverage can be different, and different UEs may have different rx architectures, so we should define those conditions.

- CATT think R1 is discussing two waveforms, and for OFDM based design coverage is the same. So at least for OOK based design we need such conditions.

- Xiaomi ask for Nokia P2 whether it means we consider low mobility status.

- Lenovo think only MR is needed in P4.

- CATT wonders whether P3 and P4 mean entry condition is related to legacy measurement but not LR measurements. Nokia consider both.

- VDF think the UE behaviour cannot be optional.

- CATT think for P2 we cannot say ‘UE wakes up the MR’, as the MR may be up already.

Chair: there are different understandings regarding the UE behaviour for different stages, so we may need to postpone this until we understand better, e.g., based on R1 progress/input.

Discussion on ‘subgrouping’ based on Apple proposal 8-9:

- CATT, Samsung, Lenovo, HW, LG E agree on P8. Lenovo wonders whether P8 applies for both cases with or without PEI configuration.

- CATT think P9 can wait as R1 is discussing on it. Samsung think we do not need to discuss P9 for now.

- vivo wonders whether in R2 we can already make some progress on the # of sub-groups, and think it helps R1 to progress as well. Ericsson think R1 will look at the feasibility of different payload sizes and agree that R2 can progress. Apple think this should be decided in R1. QC think R1 is discussing this right now and R2 can just wait. VDF think it is helpful to provide R2 input to R1.

* The PEI subgrouping method is taken as baseline for LP-WUS subgrouping, i.e. CN assigned and UE\_ID based subgrouping. FFS the maximum number of subgroups.

R2-2402159 Views on procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE China Telecom discussion Rel-19 NR\_LPWUS-Core

R2-2402194 Discussion on procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2402347 Discussion on LP-WUS operation in IDLE/INACTIVE modes Spreadtrum Communications discussion Rel-19

R2-2402446 General considerations on the procedure for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2402539 Analysis on Procedure and Configuration of LP-WUS for IDLE/INACTIVE Modes CATT discussion Rel-19 NR\_LPWUS-Core

R2-2402592 Discussion on procedure of LP-WUS in RRC\_IDLE INACITVE NEC discussion Rel-19 NR\_LPWUS-Core

R2-2402597 Discussion on entry exit conditions for LP-WUS monitoring Sharp discussion

R2-2402624 Discussion on LP-WUS WUR in RRC\_IDLE INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

=> Withdrawn

R2-2402690 Overall procedure of LP-WUS in RRC\_IDLE/INACTIVE HONOR discussion Rel-19 NR\_LPWUS-Core

R2-2402754 Procedure and configuration of LP-WUS for IDLE and INACTIVE modes ZTE Corporation, Sanechips discussion

R2-2402875 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

=> Revised in R2-2403698

R2-2402933 Procedure and Configuration of LP-WUS in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2402963 Discussion on procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Huawei, HiSilicon discussion

R2-2402972 Procedure and configuration of LP-WUS LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2403028 LP-WUS operation in IDLE INACTIVE modes CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2403037 Low Power Receiver: First points to address Vodafone discussion

R2-2403043 Procedure and Configuration of LP-WUS in RRC IDLE/INACTIVE Lenovo discussion NR\_LPWUS-Core

R2-2403057 RAN2 aspects on LP-WUS/WUR in RRC Idle/Inactive mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2403135 LP-WUS based paging Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2403333 Discussion on LP-WUS operation in RRC\_IDLE/INACTIVE modes InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2403550 WUR in Idle and Inactive Ericsson discussion Rel-19 NR\_LPWUS-Core

### 8.4.3 RRM measurement relaxation and offloading in RRC\_IDLE INACTIVE

RRM relaxation of UE MR for both serving and neighbor cell measurements, and UE serving cell RRM measurement offloaded from MR to LP-WUR, including the necessary conditions

R2-2402625 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

*Proposal 1: RAN2 assumes RRM measurement on serving cell via MR is relaxed (may include no measurement) if the configured criteria is fulfilled. FFS whether the criteria is same as the entry condition of using LP-WUS or not.*

*Proposal 2: RAN2 assumes RRM measurement on neighboring cell via MR is relaxed (may include no measurement) if the configured criteria is fulfilled. FFS whether the criteria is same as the entry condition of using LP-WUS or not. FFS whether the criteria is same as the criteria for serving cell RRM measurement relaxation.*

*Proposal 3: RAN2 to wait for RAN4 to discuss/determine the detailed relaxation/offloading factor and requirements.*

R2-2403551 WUR and RRM measurements Ericsson discussion Rel-19 NR\_LPWUS-Core

*Proposal 1 Serving cell RRM measurement relaxation shall not impact paging nor cell re-selection performance.*

*Proposal 2 Serving cell RRM measurement relaxation for UE using WUR is discussed further in RAN4.*

*Proposal 3 RAN2 to discuss whether there are use cases where further relaxation beyond 1 hour for RRM measurements is beneficial.*

*Proposal 4 RAN2 to discuss whether higher priority frequency measurements can be relaxed beyond 1 hour when mobility is not detected and the UE is in good coverage without impacting load balancing.*

*Proposal 5 LR may perform serving cell RRM measurements instead of MR when WUR and offloading is configured in SIB, the neighbour cell measurement relaxation criteria are fulfilled and the entry conditions for using LP-WUS have been fulfilled (RAN4 may define additional conditions e.g. S criteria is met for at least x dB margin when OOK-based WUR is used).*

*Proposal 6 RAN2 to discuss intra-frequency measurements using OFDM-based WUR.*

*Proposal 7 UE does not monitor LP-WUS/LP-SS when HST measurements are configured.*

Discussions based on the above contributions:

- Samsung think there is wide support to serving cell RRM measurement rlx under certain criteria. Samsung think measurement offloading should wait for R1/R4.

- vivo think R2 can discuss on criteria first.

- Apple wonders whether meas rlx includes offloading or not, and think we should first align understanding on the terms. Vivo think it useful to align and think in R1 disc offloading means that nothing is on MR and all meas is on LR. LG E has different understanding and think in this case MR can still do measurement. OPPO share this understanding.

- VDF think P1 in vivo paper is not so clear, e.g., whether LR measurement is included or not. VDF think the functionality of meas rlx should be clarified before decision.

- CATT think the part ‘may include no meas’ relates to offloading.

- On P1 from Ericsson paper, HW not sure how R2 evaluate it and think it is up to R1/R4. Vivo share this view.

- Lenovo agree with vivo P1 with ‘may include no mesa’ removed. Ericsson and VDF think further discussion is needed. Sony think further clarification of the methods is needed.

*??* On RRM relaxation of UE MR for serving cell measurements: RAN2 assumes RRM measurement relaxation on serving cell via MR if the configured criteria is fulfilled is possible, final decision is up to RAN4.

?? FFS in this case whether LR is also used for RRM measurement on serving cell.

~~?? Detailed methods of measurement relaxation and offloading are up to RAN4.~~

R2-2402201 Discussion on RRM measurement in RRC IDLE and INACTIVE OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2402348 Discussion on RRM measurement relaxation and offloading in IDLE/INACTIVE mode Spreadtrum Communications discussion Rel-19

R2-2402447 RRM measurement relaxation for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2402477 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2402540 RRM Relaxation and Offloading in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2402593 Discussion on RRM measurement for LP-WUS in RRC\_IDLE INACTIVE NEC discussion Rel-19 NR\_LPWUS-Core

R2-2402598 Discussion on serving cell RRM measurement offloading Sharp discussion

R2-2402728 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Lenovo discussion Rel-19

R2-2402755 RRM measurement relaxation for IDLEINACTIVE modes ZTE Corporation, Sanechips discussion

R2-2402876 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

=> Revised in R2-2403699

R2-2403699 RRM measurement relaxation and offloading in RRC\_IDLE and RRC\_INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

R2-2402934 RRM measurement relaxation and offloading in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2402973 RRM Measurement offloading to LR LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2403029 Discussion on LP-WUR measurement offloading in IDLE INACTIVE modes CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2403058 Discussion on RRMRAN2 aspects foron LP-WUS/WUR Sony discussion Rel-19 NR\_LPWUS-Core

R2-2403116 Discussion on RRM measurement relaxation in RRC\_IDLE/INACTIVE China Telecom discussion

R2-2403136 LP-WUS RRM measurement relaxation and offloading Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2403273 RRM measurement relaxation in RRC\_IDLE/INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

### 8.4.4 Procedures for LP-WUS in RRC\_CONNECTED

Procedures to allow UE MR PDCCH monitoring triggered by LP-WUS including activation and deactivation procedure of LP-WUS monitoring.

No contributions are expected and this AI will not be treated in RAN2#125bis

R2-2403059 Considerations on LP-WUS/WUR in RRC Connected mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2403334 Discussion on LP-WUS operation in RRC\_CONNECTED mode InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2403696 Discussion on LP-WUS WUR in RRC\_CONNECTED vivo discussion Rel-19 NR\_LPWUS-Core Late

## List of post meeting email discussions

* [Post125bis][203][MUSIM] CR for TS 38.331 (vivo)

Scope: Update and review the CR for TS 38.331, update the RIL list based on agreements in this meeting.

Intended outcome: endorsed CR and updated RIL list

Deadline: Short

* [Post125bis][204][MIMOevo] CR for TS 38.321 (Samsung)

Scope: Update and review the CR for TS 38.321.

Intended outcome: endorsed CR

Deadline: Short

* [Post125bis][205][MIMOevo] CR for TS 38.331 (Ericsson)

Scope: Update and review the CR for TS 38.331, update the RIL list based on agreements in this meeting.

Intended outcome: endorsed CR and updated RIL list

Deadline: Short