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

Hefei, China, Oct 14th – 18th, 2024

Source: RAN2 Vice Chairman (CATT)

Title: Report from session on Rel-18 MIMO and MUSIM, Rel-19 MIMO, LPWUS, and SBFD

## Organizational email discussion

* [AT127bis][200] Organizational – Rel-18 MIMO and MUSIM, Rel-19 MIMO, LPWUS, and SBFD (RAN2 VC)

Scope:

a) Share plans for online/offline discussions during the meeting, and

b) Share draft session notes and agreements for review

## 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: 1 tdocs

### 7.17.1 Organizational

Incoming LS, Rapporteur input, etc..

Corrections to TS 38.300.

R2-2408854 Clarification of UE capability restrictions in MUSIM Ericsson CR Rel-18 38.300 18.3.0 0920 - F NR\_DualTxRx\_MUSIM-Core

DISCUSSION

* Samsung do not think the last part ‘if the UE has indicated…’ is needed, other parts OK.
* For the last part, ZTE think the intention has been captured in stage 3.

**[CB]** quick checking in CB

### 7.17.2 Corrections

R2-2408029 Clarification for the initiation of the MUSIM proactive UAI after HO/CHO Huawei, HiSilicon discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

DISCUSSION

* Samsung wonder what is the difference between the proposed note and the existing note 4? HW think the ‘latest configuration’ in the current note is not clear.
* HW explain it is not clear since this UAI now has two cases, proactive and reactive cases. Samsung think UE sets the UAI info based on procedural text which are clear.
* Vivo think the proposed note does not give new info compared with the current.
* Nokia wonder whether this mandate some NW behavior in terms of configuration.
* Noted.

R2-2408403 Correction to the musim-AffectedBandsList and musim-AvoidedBandsList ZTE Corporation CR Rel-18 38.331 18.3.0 5006 - F NR\_DualTxRx\_MUSIM-Core

* Samsung, Ericsson do not think the first two changes are needed, and open to discuss the 3rd.

**[CB]** quick checking in CB

## 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: 1 tdoc

R2-2408510 Clarification to the k value in STx2P PHR MAC CE Huawei, HiSilicon CR Rel-18 38.321 18.3.0 1939 - F NR\_MIMO\_evo\_DL\_UL-Core

=> Withdrawn

### 7.20.1 Organizational

Incoming LS, Rapporteur input, etc..

Stage 2 corrections.

### 7.20.2 Corrections

RRC and UE capabilties

R2-2408180 Correction on simultaneousU-TCI-UpdateListx CATT, Nokia discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

DISCUSSION

* CATT think there are some offline comments, and we need further offline discussion.
* Ericsson explain there is a case missing when you have mTRP in DL but sTRP in UL. Samsung not sure whether we need to consider the UL mTRP.
* ZTE fine with the proposed changes.
* Samsung think the last sentence in the proposed change is not needed.
* Postponed, with the understanding that the part ‘in the same list’ is agreeable.

R2-2408912 Correction to SRS resources for UL full power transmission mode 2 Ericsson CR Rel-18 38.306 18.3.0 1189 - F NR\_MIMO\_evo\_DL\_UL-Core

DISCUSSION

* LG E think this sentence has already been covered by the current spec, so not essential.
* For codebookParameter8TxPUSCH-r18, the common understanding is that ‘A UE supporting ul-SRS-TransMode2-r18 shall set the leading / leftmost bit (bit 0) to 1.’
* CR is not pursued.

8Tx related

R2-2408352 Discussion on supporting 8Tx in MAC specification ASUSTeK discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 1: For uplink grant modeling of HARQ operation for uplink spatial multiplexing, a DCI schedules a single uplink grant for two-TB transmission for a HARQ process.*

R2-2408748 Considerations on Remaining UP Issues for R18 MIMO ZTE Corporation discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 2a : For 8Tx, MAC entity consider there are 2 uplink grants are received from a PDCCH that schedules two TBs with two different codewords.*

*Proposal 2b: For 8Tx, there are two HARQ processes associated with one HARQ process Id for two TBs those are scheduled in a PDCCH with different codewords. It is up to UE implementation to determine the association between each HARQ process and each TB.*

DISCUSSION

* QC think R1 already agreed with one UL grant. CATT agree.
* LG E agrees with ASUSTeK proposal (Option 1). HW agree.
* CATT think for LTE it is one grant scheduling 2 TB so NR should align with that. ZTE and LG E think two UL grants are used in LTE modelling.
* HW think more checking is need for the handling of HARQ process. Ericsson think we should stick to one HARQ process. Xiaomi agree.
* Samsung from spec impact point of view it is better to have one HARQ process.
* For uplink grant modelling of HARQ operation for uplink spatial multiplexing, a DCI schedules a single uplink grant for two-TB transmission for a HARQ process. Detailed changes to the MAC spec can be further checked in the next meeting.

PHR related

R2-2409024 Correction on multi-entry PHR for MIMO STx2P multi-panel scheme Samsung CR Rel-18 38.321 18.3.0 1959 - F NR\_MIMO\_evo\_DL\_UL-Core

R2-2409092 Remaining issue on STx2P PHR LG Electronics Inc. discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2409141 Clarification on the k values in the STx2P PHR MAC CE Huawei, HiSilicon CR Rel-18 38.321 18.3.0 1970 - F NR\_MIMO\_evo\_DL\_UL-Core

DISCUSSION

* ZTE point out they have also proposal on PHR.
* [AT127bis][201][MIMOevo] Proposals for PHR related aspects (Samsung)

Scope: Discuss proposals in R2-2408748, R2-2409024, R2-2409092, R2-2409141

 Intended outcome: Summary/Proposals in R2-2409221 for CB.

 Deadline: before CB.

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

(NR\_LPWUS-Core; leading WG: RAN1; REL-19; WID [RP-241824](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_105/Docs/RP-241824.zip))

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.4.1 Organizational

LS, Rapporteur input, including workplan, etc.

Spec editor assignment suggested by WI Rapporteur

[38.300 => Ericsson]

[38.321 => Apple]

[38.331 => vivo]

[38.304 => CATT]

[38.306 => Huawei]

R1 LS

*Chair: for this R1 LS we will discuss related proposals under A.I. 8.4.2.*

R2-2407921 LS on LP-WUS operation in IDLE/INACTIVE mode (R1-2407559; contact: Apple) RAN1 LS in Rel-19 NR\_LPWUS To:RAN2, RAN4

* 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

Entry/exit condition

R2-2408447 Discussion on procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Huawei, HiSilicon discussion Rel-19

*Proposal 4: Thresholds of LP-WUS entry/exit conditions for OOK and OFDM based receivers are always configured when the respective LP-WUS configuration is provided by the network.*

*Proposal 5: Whether the measurement by LP-WUR is needed or not for LP-WUS entry condition should wait for RAN1/4’s further input.*

*Proposal 6: RAN2 to consider that the serving cell measurement by LP-WUR below configured threshold(s) as the baseline for LP-WUS exit condition. No need to introduce any additional conditions.*

*Proposal 7: RAN2 to consider how to avoid ping-pong behavior for LP-WUS entry/exit procedure.*

R2-2409058 LP-WUS in Idle and Inactive Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2407396

*Proposal 23 The LR exit condition does not include MR measurements. Use cases where the UE is required to perform MR and LR measurements simultaneously can be discussed separately.*

*Proposal 24 The entry/exit threshold may include RSRP threshold, RSRQ threshold or both.*

*Proposal 25 The entry condition is met when all the measured quantities are above the configured threshold(s).*

*Proposal 26 The exit condition is met when one or more of the measured quantities are above the configured threshold(s).*

*Proposal 27 If an LP-SS threshold is configured, a threshold below the MR serving cell threshold of the entry condition can be configured where the UE is required to perform LP-SS measurements.*

*Proposal 28 Discuss MP or OP for the entry/exist condition for LP-WUS monitoring further during stage 3.*

DISCUSSION

P4 from R2-2408447

* OPPO OK with P4. Nokia support.
* QC ask whether NW should provide config for both receiver types, or only one of them. HW think if NW support both then it provide config for both types.
* Vodafone think this is NW implementation so no need for further discussion now.

Chair: seems not easy to converge for now.

P5 from R2-2408447

* IDT think R1 will not discuss entry conditions and think we can confirm from R2. ZTE, Nokia share this view.
* ZTE think LR results are needed and it is up to NW to configure. LG E agree.
* Apple think R4 is discussing and we can wait.
* OPPO suggest we tell R4 to work on related requirements for LR. vivo think R4 will work on it.
* If NW configure thresholds for both MR and LR measurements, then the entry condition is met when all the measured results are above the configured threshold(s).

P23 from R2-2409058

* Xiaomi not sure which case is this propsoal for. Lenovo think this proposal is for LPWUS exit condition and support it. Nokia, NEC agree.
* Sony think for exit condition if we also include MR it may help to aviod ping-pong. HW, Ericsson do not think it useful.
* The LPWUS monitoring exit condition does not include MR measurements.

Subgrouping

R2-2408114 Discussion on LP-WUS WUR in RRC\_IDLE INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

*Proposal 7: For CN assigned LP-WUS subgrouping, RAN2 assumes similar signalling defined for PEI should be reused for LP-WUS subgrouping. Final design is up to SA2/CT1/RAN3 discussion.*

*Proposal 8: For UE\_ID based subgrouping, similar formula defined for PEI subgrouping is reused for LP-WUS subgrouping, i.e.,*

*SubgroupID = (floor (UE\_ID/(N\*Ns\*Np)) mod subgroupsNumForUEID) + (subgroupsNumPerPO – subgroupsNumForUEID), where*

*- UE\_ID is related to 5G-S-TMSI,*

*- N is the number of total paging frames in one DRX cycle,*

*- Ns is the number of the PO for a PF,*

*- Np is the number of subgroupNumForUEID for PEI, if configured; otherwise, Np is 1,*

*- subgroupsNumForUEID and subgroupsNumPerPO are the subgroup number for UE\_ID based subgrouping for LP-WUS and the total subgroup number for LP-WUS, respectively.*

*Proposal 9: In order to allow UE to use LP-WUS together with PEI to reduce paging false alarm rate, it is expected independent subgroup ID is applied for a UE.*

*Proposal 10: For UE\_ID based subgrouping, different bits in 5G-S-TMSI are used as UE\_ID for LP-WUS subgrouping and the PEI subgrouping.*

DISCUSSION

P7

* CATT, OPPO, QC fine with P7. CATT wonders if we send LS to those impacted WGs. Vivo explain that intention is to inform them. Vivo think if we inform them we also need to conclude on P9.
* LG E support P7 and OK to send LS.
* OPPO not sure if we need to inform R3. Vivo think R3 is needed based on previous work for PEI.

P8

* QC think for P8 we need to wait for R1.
* Xiaomi generally fine with P8, and wonder whether this is only for UEs supporting both LPWUS and PEI. Vivo think there is no such restriction.
* HW support P8.
* CATT think this formula has some problem with the introduction of Np, since we do not know what is the maximum number of subgroups that will be defined by R1. Ericsson think for inactive case, PEI use same subgroup for inactive and idle.
* HW think Np should be at least 8.
* Samsung think we just remove Np from the equation and think it is enhancement. LG E agree.

P9

* Xiaomi not sure whether we need this and think we leave this to CT1.
* OPPO do not want to couple these two features and think this relates to the R1 discussion on # of subgrouping. Sony share this view, but from UE power saving point of view.
* QC think this proposal is for UE supporting both LPWUS and PEI, and support this proposal.
* Ericsson do not agree with P9, and think there is case when there is small # of UEs supporting LPWUS and large # of UEs supporting PEI, and in this case the false alarm rate is not reduced.
* For CN assigned LP-WUS subgrouping, RAN2 assumes similar procedure for PEI will be used for LP-WUS subgrouping. Final design is up to SA2/CT1/RAN3 discussion.
* For UE\_ID based subgrouping, similar formula defined for PEI subgrouping is reused for LP-WUS subgrouping.
* RAN2 inform this conclusion to SA2/CT1/RAN3.
* [AT127bis][202][LPWUS] LS to SA2/CT1/RAN3 on subgrouping progress (vivo)

 Intended outcome: Draft LS in R2-2409222 to inform our conclusions.

 Deadline: before CB

On R1 LS (R2-2407921)

R2-2409157 On LR and MR operating frequencies (related to LS in R1-2407559) Vodafone discussion Rel-19

*Proposal 1: Support offloading RRM measurement to LR when LP-SS and NR channels are located in different carriers/bands if deemed feasible by RAN4.*

*Proposal 2: To avoid overloading LR band, support that the MR of a UE is able to receive paging messages on the LR band and reselects to another band to perform random access.*

*Proposal 3: Before going to deep sleep mode, the UE shall store information about the LR band in order to monitor paging on this band. The UE shall also keep information on the cell it was camping on to perform random access upon being paged.*

R2-2408572 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

*Proposal 1: RAN2 LP-WUS discussion focuses on intra-frequency scenario, and the support of inter-frequency scenario is deprioritized in R18.*

*Proposal 2: It’s up to NW implementation to set LP-WUS frequency as high priority in order to help LP-WUS capable UE camps on.*

DISCUSSION

* Samsung support Apple proposal, and UE should inform via UE capability if it only support LPWUS in some of the bands. HW share this view.
* VDF think with Apple way the load on lower band is too high and that is problematic.
* Vivo understand that from R2 point of view we cannot make decision, and we in R2 just discuss what’s the impact/possible solutions with different ways. HW support this.
* QC think it is very difficult to realize VDF proposals, and think some delay will be introduced for paging response.
* ZTE think we can tell R1/4 that we are now focusing on intra-freq but it does not mean we de-prioritize other cases.
* Nokia think inter freq solutions are difficult and may be considered in later release.
* CATT think R1 LS just says MR/LR work on different bands so we need to identify issues and tell R1. CATT think we do not need to discuss detailed solutions.
* NEC has worry about working on different bands e.g., MR/LR results for measurement relax.
* Ericsson agree with VDF we cannot simply prioritize those bands supporting LPWUS, and think more discussions are needed to see what the consequences are.
* OPPO not sure we need to discuss solutions. QC think the discussions in R2 does not mean we need to introduce any new solutions to support inter-band solutions.

R2-2408007 Procedure and configuration of LP-WUS for IDLE and INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2408043 LP-WUS in RRC\_IDLE and INACTIVE China Telecom discussion Rel-19 NR\_LPWUS-Core

R2-2408072 LP-WUS operation in IDLE/INACTIVE modes CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2408168 Discussion on LP-WUS operation in IDLE/INACTIVE mode Spreadtrum Communications discussion Rel-19

R2-2408182 LP-WUS in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2408239 Discussion on LP-WUS in RRC\_IDLE and RRC\_INACTIVE Sharp discussion Rel-19

R2-2408289 Procedure of LP-WUS in RRC\_IDLE and INACTIVE HONOR discussion Rel-19 NR\_LPWUS-Core

R2-2408415 Discussion on LP-WUS in RRC\_IDLE INACTIVE NEC discussion Rel-19 NR\_LPWUS-Core

R2-2408428 General considerations on the procedure for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2408450 Discussion on procedure and configuration of LP-WUS in RRC\_IDLEINACTIVE OPPO discussion

R2-2408489 Procedure and Configuration of LP-WUS in RRC Idle/ Inactive Lenovo discussion Rel-19 NR\_LPWUS-Core

R2-2408709 RAN2 aspects on LP-WUS/WUR in RRC Idle/Inactive mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2408741 LP-WUS in IDLE and INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

R2-2408763 LP-WUS operation in IDLE/Inactive state Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2408768 LP-WUS operation in RRC\_IDLE and RRC\_INACTIVE LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2408949 Discussion on LP-WUS operation in RRC\_IDLE/INACTIVE modes InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2409005 Procedure and Configuration of LP-WUS in RRC Idle Inactive Mode Samsung discussion Rel-19

Agreements made in this agenda item

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| --- |
| * If NW configure thresholds for both MR and LR measurements, then the entry condition is met when all the measured results are above the configured threshold(s).
* The LPWUS monitoring exit condition does not include MR measurements.
* For CN assigned LP-WUS subgrouping, RAN2 assumes similar procedure for PEI will be used for LP-WUS subgrouping. Final design is up to SA2/CT1/RAN3 discussion.
* For UE\_ID based subgrouping, similar formula defined for PEI subgrouping is reused for LP-WUS subgrouping.
* RAN2 inform this conclusion to SA2/CT1/RAN3.
 |

### 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

RRM relaxation for serving and neighbor cell

R2-2408769 RRM relaxation and RRM offloading LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

*Regarding the neighbor cell measurement relaxation*

*Proposal 1 For neighbor cell measurement relaxation for UEs capable of LP-WUS, do not define additional criterion over the R16 criteria, i.e. ‘UE with low mobility’ and ‘UE not at cell edge’.*

*Proposal 2 For neighbor cell measurement relaxation for UEs capable of LP-WUS, enhance the R16 criteria, i.e. ‘UE with low mobility’ and ‘UE not at cell edge’, to enable UE to evaluate them based on the LR measurements when the serving cell measurement is offloaded to LR.*

 DISCUSSION

* Ericsson, Lenovo, IDT, Nokia, QC support P1, P2.
* Lenovo wonders whether for P2 whether ‘offloaded’ means fully offloading or partial. LG E explains for serving cell relax case there is MR result so R16 criteria can be reused.
* HW think for P2 should wait for R4 if it is talking about full offloading.
* HW think P1 should wait for R4.
* Xiaomi agree with P1. For P2 Xiaomi agree with HW that it should wait for R4.
* Nokia do not think we should wait for R4.

Working assumption

* For neighbor cell measurement relaxation for UEs capable of LP-WUS, do not define additional MR-based criterion over the R16 criteria. RAN2 assume ‘UE not at cell edge’ is reused, FFS on ‘UE with low mobility’.
* FFS (if needed) on enhancements based on R16 criteria (e.g., based on the LR measurements) for the case when MR serving cell measurement results are not available.

R2-2408159 Discussion on RRM measurement in RRC IDLE and INACTIVE OPPO discussion Rel-19 NR\_LPWUS-Core

*Proposal 1 For the entry condition for relaxing serving cell measurement and neighbour cell measurement on MR, the serving cell measurement result on both MR and LR should be higher than configured threshold(s).*

*Proposal 2 For the exit condition for relaxing serving cell measurement and neighbour cell measurement on MR, the serving cell measurement result on MR or LR is lower than configured threshold(s).*

*Proposal 3 The configured threshold for entry serving cell and neighbour cell measurement relaxation should be lower than the threshold configured for serving cell measurement fully offloading from MR to LR.*

*Proposal 4 Low mobility criterion can also be considered for serving cell measurement offloading and serving cell and neighbour cell measurement relaxation.*

Agreements made in this agenda item

|  |
| --- |
| Working assumption* For neighbor cell measurement relaxation for UEs capable of LP-WUS, do not define additional MR-based criterion over the R16 criteria. RAN2 assume ‘UE not at cell edge’ is reused, FFS on ‘UE with low mobility’.
* FFS (if needed) on enhancements based on R16 criteria (e.g., based on the LR measurements) for the case when MR serving cell measurement results are not available.
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Chair: other proposals can be discussed if time allows in CB session.

R2-2408008 RRM measurement relaxation and offloading in RRC\_IDLE and RRC\_INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2408071 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE INACTIVE CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2408111 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2408115 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

R2-2408169 Discussion on RRM measurement relaxation in IDLE/INACTIVE mode Spreadtrum Communications discussion Rel-19

R2-2408183 RRM Relaxation and Offloading in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2408240 Discussion on RRM measurement relaxation and offloading Sharp discussion Rel-19

R2-2408306 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Lenovo discussion Rel-19

R2-2408416 Discussion on LP-WUS RRM NEC discussion Rel-19 NR\_LPWUS-Core

R2-2408429 Discussion on RRM measurement relaxation for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2408573 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

R2-2408710 Discussion on RRM aspects for LP-WUS/WUR Sony discussion Rel-19 NR\_LPWUS-Core

R2-2408742 RRM measurement relaxation in RRC\_IDLE/INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

R2-2408765 LP-WUS RRM measurement relaxation and offloading Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2408849 RRM Measurement Relaxation and Offloading in RRC\_IDLE /INACTIVE Mode China Telecom discussion

R2-2408950 Discussion on RRM measurement relaxation and offloading InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2409006 RRM measurement relaxation and offloading in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2409059 LP-WUS and RRM measurements Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2407397

### 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.

Option 1-2 related

R2-2409076 LP-WUS in RRC\_CONNECTED Nokia discussion

*Proposal 1. In option 1-2, a new LP-WUS On-duration timer is introduced, which starts an offset after detection of LP-WUS.*

*Proposal 2. In option 1-2, a new LP-WUS inactivity timer is introduced, which*

*- starts upon PDCCH detection following LP-WUS detection, and restarts upon PDCCH scheduling a new transmission in UL/DL while the LP-WUS inactivity timer is running.*

*- starts LP-WUS monitoring upon expiry of the timer*

R2-2408184 Analysis on LP-WUS for RRC\_CONNECTED Mode CATT discussion Rel-19 NR\_LPWUS-Core

*Proposal 7: Define a new timer for PDCCH monitoring triggered by LP-WUS, i.e. after LP-WUS triggers the UE to perform PDCCH monitoring, the UE starts a new timer. When the new timer is running, the UE monitors PDCCH, i.e. the UE is in DRX Active Time.*

*Proposal 8: When the UE receives PDCCH schedules new transmission for DL/UL, the UE starts/restarts drx-InactivityTimer.*

*Proposal 10: The drx-onDurationTimer is not started in Option 1-2.*

R2-2409007 Procedures for LP-WUS in RRC Connected Mode Samsung discussion Rel-19

*Proposal 1. During the PDCCH monitoring timer is running (e.g., drx-onDurationTimer for Option 1-1 and FFS new/legacy timer for Option 1-2), UE behaves the same as in UE C-DRX on duration, e.g., apply drx-inactivityTimer for a successful PDCCH reception.*

*Proposal 2. When the LP-WUS capable UE is monitoring PDCCH with Option 1-2, and if the drx-inactivityTimer is expired, the UE goes back to LP-WUS monitoring if possible.*

R2-2408116 Discussion on LP-WUS WUR in RRC\_Connected vivo discussion Rel-19 NR\_LPWUS-Core

*Proposal 2: For Option 1-2, the timer duration for PDCCH monitoring triggered by LP-WUS is defined as part of C-DRX Active Time.*

*Proposal 3: For Option 1-2, during the timer for PDCCH monitoring triggered by LP-WUS is running, periodic CSI/L1-RSRP report and SP CSI report behaviour are the same as legacy drx-onDurationTimer duration without DCP configuration, i.e. always report during this timer triggered by LP-WUS.*

*Proposal 5: For Option 1-2, the length of the timer for PDCCH monitoring triggered by LP-WUS is configured by gNB. The length of this time is separate from the legacy drx-onDurationtimer.*

*Proposal 6: For Option 1-2, after the timer for PDCCH monitoring triggered by LP-WUS expires, the UE stops PDCCH monitoring, and switch back to LP-WUS monitoring.*

*Proposal 9: For Option 1-2, PDCCH monitoring behaviors related to legacy C-DRX Active Time other than drx-onDurationTimer are not affected. The C-DRX Active Time includes:*

*o ra-ContentionResolutionTimer, msgB-ResponseWindow, SR related C-DRX Active Time, CFRA for BFR related C-DRX Active Time, RACH-less LTM/handover procedure.*

Chair: other proposals can be discussed if time allows in CB session.

R2-2408009 Procedures for LP-WUS in RRC\_CONNECTED ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2408030 Discussion on LP-WUS for RRC\_CONNECTED mode Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2408044 Procedures for LP-WUS in RRC\_CONNECTED China Telecom discussion Rel-19 NR\_LPWUS-Core

R2-2408084 Discussion on LP-WUS operation in CONNECTED mode CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2408290 Procedure of LP-WUS in RRC\_CONNECTED HONOR discussion Rel-19 NR\_LPWUS-Core

R2-2408417 Discussion on LP-WUS in RRC\_CONNECTED NEC discussion Rel-19 NR\_LPWUS-Core

R2-2408430 Discussing on LP-WUS monitoring for RRC\_Connected Xiaomi Communications discussion

R2-2408451 Discussion on LP-WUS in RRC\_CONNECTED OPPO discussion

R2-2408490 LP-WUS in RRC Connected Mode Lenovo discussion NR\_LPWUS-Core

R2-2408574 Procedures for LP-WUS in RRC\_CONNECTED Apple discussion Rel-19 NR\_LPWUS-Core

R2-2408605 LP-WUS operation in RRC\_CONNECTED Mode LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

=> Withdrawn

R2-2408692 LP-WUS in CONNECTED mode InterDigital discussion Rel-19 NR\_LPWUS-Core

R2-2408711 Considerations on LP-WUS/WUR in RRC Connected mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2408764 LP-WUS operation in CONNECTED state Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2409052 Discussion on LP-WUS for CONNECTED state NTT DOCOMO INC. discussion Rel-19

R2-2409060 LP-WUS in Connected Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2407398

R2-2409160 LP-WUS operation in RRC\_CONNECTED Mode LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

## 8.11 Evolution of NR duplex operation: Sub-band full duplex (SBFD)

(NR\_duplex\_evo-Core; leading WG: RAN1; REL-19; WID: [RP‑241614](https://www.3gpp.org/ftp/meetings_3gpp_sync/ran/docs/RP-241614.zip))

Time budget: 0.5 TU

Tdoc Limitation: 2 tdocs

### 8.11.1 Organizational

Incoming LS, Rapporteur input, including workplan, etc.

Spec editor assignment suggested by WI Rapporteur

[38.300 => CATT]

[38.321 => Samsung]

[38.331 => Huawei]

[38.306 => Ericsson]

[38.304 => NEC]

R1 LS

R2-2407917 LS to RAN3 on PHY/L1 aspects of information exchange among gNBs for CLI mitigation (R1-2407533; contact: Ericsson) RAN1 LS in Rel-19 NR\_duplex\_evo To:RAN3 Cc:RAN2

* ?? Noted

### 8.11.2 Random access in SBFD

RAN2 impacts to support SBFD operation to support random access in SBFD symbols by UEs in RRC \_CONNECTED mode and RRC\_IDLE/INACTIVE mode.

Early indication

R2-2408103 Discussion on random access procedure in SBFD vivo discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 2: For Msg1-based early identification for SBFD-aware UE, RAN2 to discuss and determine whether to down-select from the following two options:*

*- Opt.a: The NW can identify the SBFD-aware UE if the UE sends Msg1 on ‘additional ROs’ as defined by RAN1;*

*- Opt.b: SBFD is considered as a new feature for PRACH preamble partitioning, i.e. the NW can configure SBFD as a feature as ‘true’ for a set of random access resources, which is similar to RedCap, Msg3 repetition, etc,.*

*Proposal 3: It is up to the NW implementation how to handle if it identifies the SBFD-aware UE with Msg1-based early identification, e.g. the NW decides whether to schedule SBFD resources to the SBFD-aware UE for Msg3 transmission.*

*Proposal 4: RAN2 to confirm not to support Msg3-based early identification for SBFD-aware UE.*

R2-2407950 Random Access in SBFD symbols CATT discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 2: If additional RO is selected by SBFD-aware UE, early identification in Msg1 is supported.*

*Proposal 3: If legacy RO is selected by SBFD-aware UE, early identification in Msg1 is not supported.*

*Proposal 4: In case of early identification in Msg1 is not supported, UE can indicate it supports SBFD in Msg3.*

*Proposal 5: SBFD is not introduced as a feature (similar as RedCap, SDT and etc.) for random access.*

RACH resource selection

R2-2409152 Discussion on Random Access procedure for SBFD LG Electronics Inc. discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 3. For RACH configuration Option 1 with Alt 1-1 (use one single RACH configuration with possible enhancement), RAN2 assumes that the same MAC procedure can be applied for both SBFD-aware UE and legacy UE.*

*Proposal 4. For RACH configuration Option 1 with Alt 1-1, it’s up to UE implementation to select one type between legacy-ROs and additional-ROs (i.e., no prioritization rule between SBFD RO and legacy RO).*

*Proposal 5. For RACH configuration Option 2, whether the SBFD-aware UE performs RA procedure using the legacy RACH configuration or additional RACH configuration should be determined before the RA type selection.*

*Proposal 6. For RACH configuration Option 2, SBFD-aware UE performs RA procedure using the SBFD RACH configuration, if it is configured. Additional conditions to use SBFD RACH configuration (e.g., RSRP threshold) can be defined, based on RAN1 discussion.*

*Proposal 7. For PRACH transmission re-attempt in one random access procedure on RACH configuration Option 1 with Alt 1-1, SBFD-aware UE independently selects an RO between legacy RO and SBFD RO for each re-attempt.*

*Proposal 8. For PRACH transmission re-attempt in one random access procedure on RACH configuration Option 2, use ROs of the same type (i.e., legacy-RO or Additional-RO) as the earlier PRACH transmission.*

R2-2408420 Random Access Procedures for SBFD Sharp discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 3 An SBFD-aware UE selects either additional RO or legacy RO based on comparing measured RSRP with a RSRP threshold for RO selection in case of initial RA attempt.*

*Proposal 4 A fallback procedure on RO type selection from additional RO in SBFD symbols to legacy RO is supported when the number of PRACH transmission attempts exceed a threshold.*

*Proposal 5 RAN2 to discuss whether to support a fallback procedure on RO type selection from legacy RO to additional RO in SBFD symbols is supported when the number of PRACH transmission attempts exceed a threshold.*

R2-2408799 Views on random access for SBFD Qualcomm Incorporated discussion NR\_duplex\_evo-Core

*Proposal 6: Upon initiation of RACH procedure for a SBFD-aware UE, if no additional indication is from network, UE is allowed to select one type of ROs between legacy-ROs and additional-ROs based on certain specified/configured conditions/prioritizations.*

*Proposal 7: For the PRACH transmission re-attempt in one RACH procedure, after certain (configured) number of times of RACH attempt in one type of RACH occasions, and if additional certain conditions are met, UE is allowed to switch to another type of RACH occasions for RACH re-attempt.*

RACH configuration

R2-2409008 Random access in SBFD Samsung discussion Rel-19

*Proposal 1: RAN2 to confirm that the below two RACH configuration options are considered for SBFD based random access:*

*- Option 1: Use one single RACH configuration, and only based on the existing parameters of the single RACH configuration*

*- Option 2: Use two separate RACH configurations, including one legacy RACH configuration and one additional RACH configuration*

*Proposal 2: For RACH configuration Option 2, RAN2 needs to specify a new RRC IE for the new SBFD based RACH configuration with a new set of parameters.*

*Proposal 3: RAN2 to confirm that the RACH configuration for SBFD is transmitted via SIB1, for either option 1 or 2. FFS dedicated RRC signalling detail.*

R2-2407955 Discussion on RACH in SBFD Xiaomi discussion Rel-19

R2-2408067 Discussion on random access in SBFD CMCC discussion Rel-19 NR\_duplex\_evo-Core

R2-2408219 Discussion on random access procedure in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2408364 Impacts on the random access by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

R2-2408508 SBFD RACH configuration for initial random access Charter Communications, Inc discussion NR\_duplex\_evo Late

R2-2408550 Random Access for SBFD Operation NEC discussion

R2-2408594 Framework to support RACH in SBFD Apple discussion Rel-19 NR\_duplex\_evo-Core

R2-2408647 Random Access Operation of SBFD Nokia Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2408690 Random access in Sub-Band Full Duplex Google Ireland Limited discussion

R2-2408717 Random access for SBFD Operation Sony discussion Rel-19 NR\_duplex\_evo-Core

R2-2408855 SBFD RA aspects Ericsson discussion Rel-19 NR\_duplex\_evo-Core

### 8.11.3 Other aspects

Other RAN2 impacts with SBFD if not covered by the previous agenda items.

R2-2408365 Discussion on the SBFD configuration and CLI measurement Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 1: For cell specific time resource indication of SBFD subbands, the network can indicate which symbol is SBFD symbol to SBFD-aware UEs, e.g. via the extended TDD-UL-DL-ConfigCommon field.*

*Proposal 2: For cell specific frequency resource indication of SBFD subbands, the network can indicate the frequency locations of SBFD subbands to SBFD-aware UEs, e.g. via the extended SCS-SpecificCarrier field.*

*Proposal 3: For UL resource muting for PUSCH, the configuration of time and frequency location for UL resource muting should be introduced.*

*Proposal 4: For L1 based UE-to-UE CLI measurement mechanism, the configuration of periodic, semi-persistent or aperiodic UE-to-UE CLI measurement resource (set) could be introduced, e.g. in CSI-MeasConfig field.*

*Proposal 5: For L1 based UE-to-UE CLI reporting mechanism, the configuration of report quantities could be introduced, e.g. in CSI-ReportConfig field.*

*Proposal 6: The triggering conditions for UE-to-UE CLI measurement report can be either periodical or event-triggered.*

*Proposal 7: For gNB-to-gNB CLI measurement, wait for RAN3 conclusion on what to be included in the inter-node message.*

R2-2409089 Other aspects of SBFD Nokia discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 1: Regarding UE specific SBFD parameter signaling RAN2 should wait RAN1 (and possibly RAN4 need to give input as well) to confirm whether they are needed or not*

*Proposal 2: RAN2 can wait before discussing further details until we get more exact parameter lists from RAN1/RAN4 regarding detailed CLI and SBFD parameters.*

*Proposal 3: Support SBFD-aware UEs to prioritize SBFD cells over non-SBFD cells.*

*Proposal 4: For inter-cell CSI-RS measurements, UE is provided with information of the SBFD configuration of neighbouring cells.*

R2-2407951 Discussion on other aspects for SBFD CATT discussion Rel-19 NR\_duplex\_evo-Core

R2-2408035 Other aspects of SBFD Xiaomi discussion Rel-19 NR\_duplex\_evo-Core

R2-2408089 Discussion on SBFD related issues CMCC discussion Rel-19 NR\_duplex\_evo-Core

R2-2408104 Discussion on other aspects in SBFD vivo discussion Rel-19 NR\_duplex\_evo-Core

R2-2408220 Discussion on CLI measurement in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2408800 Other aspects of SBFD Qualcomm Incorporated discussion NR\_duplex\_evo-Core

R2-2408856 Non-RA aspects for subband full duplex (SBFD) operation Ericsson discussion Rel-19 NR\_duplex\_evo-Core

R2-2409098 Support of Cross Link Interference in SBFD Samsung discussion Rel-19 NR\_duplex\_evo-Core

## 8.12 NR MIMO Phase 5

(NR\_MIMO\_Ph5-Core; leading WG: RAN1; REL-19; WID: [RP-242394](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_105/Docs/RP-242394.zip))

Time budget: 0.5 TU

Tdoc Limitation: 1 tdocs

### 8.12.1 Organizational

LSs and rapporteur input, including workplan, etc.

Spec editor assignment suggested by WI Rapporteur

38.300 => CMCC

38.321 => Samsung

38.331 => Ericsson

R1 LS

R2-2407906 LS to RAN2 on RRC and MAC CE impacts for Rel-19 NR MIMO Ph5 (R1-2407285; contact: Samsung) RAN1 LS in Rel-19 NR\_MIMO\_Ph5 To:RAN2

* Samsung suggest we note this LS and discuss the RRC/MAC aspects based on company contributions
* Huawei wonders for plOffset whether it is R1 or R2 to decide the value. Samsung think R1 should decide. ZTE point out that R1 already concluded in this meeting.
* Noted

Work plan

R2-2409128 Work Plan for Rel-19 on NR MIMO Phase 5 CMCC, Samsung, MediaTek Inc. Work Plan Rel-19 NR\_MIMO\_Ph5-Core

* Xiaomi think we can start CR drafting earlier.
* Noted

Running CR

R2-2408909 Running CR for MIMO Phase 5 Ericsson draftCR Rel-19 38.331 18.3.0 B NR\_MIMO\_Ph5-Core

* Ericsson think this is only for info.
* Noted

### 8.12.2 Initial analysis on RAN2 impact

Initial analysis on R2 impact, including RRC and MAC aspects

Initial discussions on potential R2 impact

*Chair: plan is to briefly go through all the propoals in #8092 and #9023 for high level understanding of the R2 impact.*

R2-2408092 RAN2 Impacts of Rel-19 NR MIMO CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

* Noted

R2-2409023 Discussion on RAN2 impacts Samsung discussion Rel-19 NR\_MIMO\_Ph5

* Noted

DISCUSSIONS:

UE initiated/event-triggered beam reporting

* Xiaomi prefer to leave those procedure in PHY so that R2 spec is simplified. OPPO think this is the R1-centric feature and we’d better wait instead of complicating things.
* CMCC think in R2 we can conclude on the NW control in terms of how UE report the BM.
* Vivo prefer to capture the evaluation procedure of event trigger BM in MAC. Ericsson, QC, MediaTek agree.
* Apple think in R1 it is FFS which layer is handling the event triggered BM so prefer to wait for R1’s progress. CATT, ZTE, LG E share this view.
* HW think R2 should also discuss and think the procedure will not be transparent to R2 spec, and prefer to have common framework for event triggered BM and LTM. LG E think these two are separate and no need to couple. OPPO think we can discuss the solutions for them separately and can check further how to capture them in the spec.
* ZTE prefer to wait for R1 for both RRC and MAC impact.

Chair: from the high level discussions, there are different views regarding whether R2 should wait for R1 on all the procedures, also there are different views regarding how to handle LTM and event triggered BM (e.g.,., whether they share a common framework.)

CSI enhancement

* Ericsson think we just follow the R1 parameters.

Asymmetric DL sTRP/UL mTRP

* Ericsson agree that we need a new MAC CE. Nokia, LG E agrees.
* Vivo not sure whether a new MAC CE is needed.
* Xiaomi prefer to have clean MAC CE design.
* Sony wonders what is the # of UL TRP for this objective. Samsung think it is multiple.
* HW think it is problematic if we configure a PL offset value in RRC and then modify via MAC CE, not sure if the proposals work. CMCC think there are existing examples, and it works. ZTE think for this potential issue we should first decide whether ‘delta’ offset is supported. Xiaomi think we need to use delta offset configuration if we use MAC CE to update the offset value. Ericsson think we should ask R1.
* Samsung think we are not ready to already send questions to R1 in this meeting.

Chair: companies are encouraged to check the listed questions in P6 in R2-2409023. We will discuss whether/what to ask to R1.

R2-2408022 Discussion on the pathloss offset update via MAC CE and RRC Xiaomi discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2408125 Discussion on UE-initiated/event-driven beam management vivo discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2408181 Discussion on MAC CE impact for PL offset updates CATT discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2408196 Discussion on UE-initiated/event-driven beam management SHARP Corporation discussion NR\_MIMO\_Ph5-Core

R2-2408402 Initial Analysis on the RAN2 Impact for the R19 MIMO ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2408511 Initial analysis on RAN2 impact for Rel-19 NR MIMO Ph5 Huawei, HiSilicon discussion NR\_MIMO\_Ph5-Core

=> Revised in R2-2409200

R2-2409200 Initial analysis on RAN2 impact for Rel-19 NR MIMO Ph5 Huawei, HiSilicon discussion NR\_MIMO\_Ph5-Core

R2-2408649 RAN2 Aspects of the NR MIMO Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2408667 User plane and Control plane impacts from MIMO Ericsson discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2408723 Enhancement for Asymmetric DL sTRP/UL mTRP Sony discussion Rel-19 NR\_MIMO\_Ph5

R2-2408795 Discussion on the design considerations for MIMO Phase 5 Qualcomm Incorporated discussion

R2-2409093 Consideration on RAN2 impact in MIMO phase 5 LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409168 Triggering condition of PHR for UL-only TRP NTT DOCOMO INC. discussion Rel-19

## List of post meeting email discussions

*Template (will be deleted in final report)*

* [AT127bis][20x][MIMOevo/MUSIM/LPWUS/SBFD/MIMO\_Ph5] Proposals for xxxxx (xxxx)

Scope: xxx

 Intended outcome: Summary/Proposals in R2-24xxxxx for CB.

 Deadline: xxx

* [Post127bis][20x][MIMOevo/MUSIM/LPWUS/SBFD/MIMO\_Ph5] xxxxx (xxxx)

Scope: xxx

Intended outcome: Summary/Proposals for xxxx

Deadline: xxx