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

DISCUSSION

* 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 Withdrawn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

* Noted.

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

* Noted.

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 think 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

* Three contributions above are noted.

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

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

* Noted.

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

* Noted.

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

* Noted.

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

* Noted.

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

* Noted.

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

* Noted.

 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

* Noted.

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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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

* Noted

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

* Noted

DISCUSSION

* LG E, Samsung, QC, Ericsson agree with CATT P2 and think for this case no spec impact. ZTE has a different view.
* LG E do not think preamble partitioning is needed since currently there are so many features using partitioning already.
* RAN2 understand that if additional RO is selected by SBFD-aware UE, early identification via Msg1 is possible from NW point of view for this UE without specification impact.

Whether msg3 based EI is needed

* LG E and Samsung support msg3 based way. HW, QC as well. QC think it is needed when UE selects legacy RO and it is beneficial. Nokia agree.
* Sharp support P4 from vivo.
* Xiaomi think if UE select legacy RO most likely it is not suitable for this UE to use SBFD resources, so msg3 based way in this case is not useful. Samsung think there are cases when it is needed.
* Vivo think it is only enhancement. LG E think there is long latency without such EI so support it.
* Ericsson think it not so critical as the benefit from SBFD is mainly for data transmission part.

Whether PRACH preamble partitioning is needed for SBFD

* ZTE, IDT think it can only be configured for legacy RO and think it is useful.
* Nokia, vivo, QC, HW, Ericsson do not think preamble partitioning is needed for SBFD.
* HW think compleixty is much larger.
* From R2 point of view, there is no need to introduce SBFD as a new feature combination in the current PRACH preamble partitioning framework.

RACH resource selection

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

* Noted

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

* Noted

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

* Noted

DISCUSSION

Do we distinguish different resource configuration cases?

* Samsung prefer simple behaviour and see no need to distinguish between different resource configuration cases. HW, Ericsson agree.
* Samsung want to discuss the procedure and criteria separately.
* LG E can accept if there is majority view.

P6 and P7 from R2-2408799

* LG E wonder what ‘additional indication’ means in P6.
* Apple think we only need to consider the case when UE select SBFD first and then FB to legacy RO. Nokia share this view. QC clarify that the intention of P7 is in line with the Apple comment.
* Samsung support P7. Samsung wonder that is ‘additional certain conditions’ in P7.
* HW, Ericsson, Charter think we should also include the case when UE selects legacy ROs first.
* Upon initiation of CBRA RACH procedure for a SBFD-aware UE, UE selects one type of ROs between legacy-ROs and additional-ROs based on certain specified/configured conditions/prioritizations, if no additional indication (FFS if there needs to be any) is from network.
* For the PRACH transmission re-attempt in one RACH procedure, after certain (configured) number of times of RACH attempt in SBFD RACH occasions, UE is allowed to switch to legacy RACH occasions. FFS about the case when UE select legacy ROs first.

RACH configuration

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

* Noted

DISCUSSION

* LG E agree with these proposals in general.
* LG E think for Option 1 under P1 we might need some extension.
* Ericsson do not see a strong need to confirm these in R2.
* ZTE suggest to FFS on whether NW can provide configurations with O1 and O2 at the same time. ZTE want to clarify that these are for CBRA, Samsung confirm.
* Google wonder about different UE capabilities and think we should discuss on that.
* The following two RACH configuration options are considered for SBFD based random access:
	+ - Option 1: Use one single RACH configuration based on the existing parameters of the single RACH configuration. Can extend the existing parameters if needed.
		- Option 2: Use two separate RACH configurations, including one legacy RACH configuration and one additional RACH configuration
* For RACH configuration Option 2, RAN2 needs to specify RRC signalling for the new SBFD based RACH configuration with a new set of parameters.
* The RACH configuration for SBFD is transmitted via SIB1.
* FFS dedicated RRC signalling detail. FFS whether NW can provide both configurations.

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

* Noted

DISCUSSION

P1, P2 from R2-2408365

* Xiaomi, LG E, ZTE, Nokia think we discuss after R1 provide parameter list.
* HW clarifies that these have been already agreed by R1 so it should be fine to confirm and think para list comes quite late. CATT agree.
* For UL resource muting for PUSCH, the configuration of time and frequency location for UL resource muting should be introduced based on R1 agreement.

P4-P7 from R2-2408365

* CATT, QC ok with P4-5.
* CATT think for P6 there is no such agreement in R1. HW think R1 leave this discussion to R2, Google agree. QC, Samsung, Ericsson think in WID we only have aperiodic report.
* Google support P6 and think periodic report means a lot of overhead.
* For P7, ZTE think we can discuss. HW think we should wait until R3 conclude what to be include in those inter node msg.
* For L1 based UE-to-UE CLI measurement mechanism, the configuration of periodic, semi-persistent or aperiodic UE-to-UE CLI measurement resource (set) should be introduced based on R1 agreement.
* For L1 based UE-to-UE CLI reporting mechanism, the configuration of report quantities should be introduced based on R1 agreement.

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

* Noted

P3

* Ericsson wonder if this means SBFD cell only on one frequence, but not on the other frequency?
* Ericsson think today we have a lot of other features not impacting cell selection. Xiaomi, LG E, CATT agree.

P4

* ZTE think the SBFD config of the neighbouring cells should be the same so no need for this proposal. Nokia, Google do not think so. HW think we should check further.

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

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