3GPP TSG-RAN WG2 Meeting #126 R2-2405701  
Fukuoka, Japan, May 20 – 24, 2024

Agenda Item: 9.1

Source: Vice Chairman (Samsung)

Title: Report from session on V2X/SL, R19 NES and MOB

Document for: Approval

Time Schedule   
Please refer to the latest schedule in the RAN2 inbox on the public 3GPP servers.

## List and Status of Offline/Email Discussions

* [POST126][101][V2X/SL] (OPPO)

**Scope:** To capture all agreements into 38.331.

**Intended outcome:** Approve RRC CR in R2-2405899.

**Deadline:** Short email discussion.

* [POST126][102][V2X/SL] (LG)

**Scope:** To capture all agreements into 38.321.

**Intended outcome:** Approve MAC CR in R2-2405900.

**Deadline:** Short email discussion.

* [POST126][103][V2X/SL] (IDC)

**Scope:** To capture all agreements into 38.300.

**Intended outcome:** Stage 2 CR in R2-2405901.

**Deadline:** Short email discussion.

## Approved outgoing LSs

## 4.3 V2X and Sidelink corrections Rel-15 and earlier

REL-15 and Earlier WIs related to V2x and Sidelink are in scope but not listed explicitly (long list).

This Agenda Item is treated in the V2X and Sidelink Breakout session

Tdoc Limitation: 1 tdocs

R2-2405433 Correction on transmission of SidelinkUEInformation Philips International B.V. CR Rel-13 36.331 13.17.0 5028 - F LTE\_eD2D\_Prox-Core

R2-2405434 Correction on transmission of SidelinkUEInformation Philips International B.V. CR Rel-14 36.331 14.16.0 5029 - A LTE\_eD2D\_Prox-Core

R2-2405435 Correction on transmission of SidelinkUEInformation Philips International B.V. CR Rel-15 36.331 15.21.0 5030 - A LTE\_eD2D\_Prox-Core

R2-2405436 Correction on transmission of SidelinkUEInformation Philips International B.V. CR Rel-16 36.331 16.15.0 5031 - A LTE\_eD2D\_Prox-Core

R2-2405437 Correction on transmission of SidelinkUEInformation Philips International B.V. CR Rel-17 36.331 17.8.0 5032 - A LTE\_eD2D\_Prox-Core

R2-2405438 Correction on transmission of SidelinkUEInformation Philips International B.V. CR Rel-18 36.331 18.1.0 5033 - A LTE\_eD2D\_Prox-Core

[NEC]: Did we have relay in LTE D2D? [Philips]: Yes, for L3 relay. [Ericsson]: Remember there was IE name which already implies relay. [Philips]: Think it is not a real editorial correction. [Qualcomm]: If it is not real editorial correction, we need to make sure whether it is needed or not. [Philips]: Based on the offline discussion during the break-time, we don’t need comeback since relay is distinguished by the IE name.

* Not pursued.

## 5.2 NR V2X

(5G\_V2X\_NRSL-Core; leading WG: RAN1; REL-16; started: Mar 19; target; Aug 20; WID: [RP-200129](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_87e/Docs/RP-200129.zip)).

CR rapporteurs will take care of miscellaneous CRs to collect small changes. Please contact / coordinate with CR rapporteur company first for small changes (e.g. non-controversial clarification/correction, editorial correction, etc.).

Tdoc Limitation: 1 tdocs

R2-2404491 Correction to RRC for SL configured grant Ericsson CR Rel-16 38.331 16.16.0 4782 - F 5G\_V2X\_NRSL-Core

R2-2404492 Correction to RRC for SL configured grant Ericsson CR Rel-17 38.331 17.8.0 4783 - A 5G\_V2X\_NRSL-Core

R2-2404493 Correction to RRC for SL configured grant Ericsson CR Rel-18 38.331 18.1.0 4784 - A 5G\_V2X\_NRSL-Core

* Withdrawn

R2-2405346 Corrections for SL RLC mode indication ZTE, Sanechips CR Rel-16 38.331 16.16.0 4825 - F 5G\_V2X\_NRSL-Core

R2-2405347 Corrections for SL RLC mode indication ZTE, Sanechips CR Rel-17 38.331 17.8.0 4826 - A 5G\_V2X\_NRSL-Core

R2-2405348 Corrections for SL RLC mode indication ZTE, Sanechips CR Rel-18 38.331 18.1.0 4827 - A 5G\_V2X\_NRSL-Core

* Agreed.

## 6.6 NR Sidelink enhancements

(NR\_SL\_enh-Core; leading WG: RAN1; REL-17; WID: [RP-202846](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_90e/Docs/RP-202846.zip))

Tdoc Limitation: 1 tdoc

Note for RRC and MAC CRs, CR rapporteur’s summary and suggestion may be provided. CR rapporteurs will take care of miscellaneous CRs to collect small changes. Please contact / coordinate with CR rapporteur company first for small changes (e.g. non-controversial clarification/correction, editorial correction, etc.). This AI also includes in-principle agreed CRs (in-principle agreed CRs are not counted in tdoc limitation).

R2-2404494 Correction to MAC on cast type Ericsson CR Rel-16 38.321 16.15.0 1836 - F NR\_SL\_enh-Core Withdrawn

R2-2404495 Correction to MAC on cast type Ericsson CR Rel-17 38.321 17.8.0 1837 - F NR\_SL\_enh-Core

R2-2404523 Correction to MAC on cast type Ericsson CR Rel-18 38.321 18.1.0 1838 - A NR\_SL\_enh-Core

[Huawei]: Understand the intention. Alternatively, we can consider removing “as indicated by upper layer”, which may be simpler. [LG]: Support Huawei’s alternative option. [Ericsson]: If we remove it, it may bring some unclearness, e.g. whether MAC entity can set all cast type by itself, etc. [Apple]: Agree with Ericsson. [Toyota]: There is some typo, “carryies” should be changed to “carries”. And in the cover sheet, “eneity” should be changed to “entity”. [Nokia]: Prefer “includes” instead of “carries”.

* “carryies” is changed to “includes”
* “eneity” is changed to “entity”
* Agreed in R2-2405891 and R2-2405892 with the changes above.

R2-2405234 Correction on tx profile for SL DRX ZTE Corporation, Sanechips CR Rel-17 38.331 17.8.0 4757 2 F NR\_SL\_enh-Core R2-2403921

R2-2405235 Correction on tx profile for SL DRX ZTE Corporation, Sanechips CR Rel-18 38.331 18.1.0 4758 2 A NR\_SL\_enh-Core R2-2403922

[Samsung]: Latest CR form is v12.3 [OPPO]: Have some more comments for the cover page. [Session chair]: Let’s comeback with the updated CRs in the afternoon (R2-2405893, R2-2405894)

* Latest CR form is used.
* CRs in R2-2405893 and R2-2405894 are agreed.

R2-2405413 Correction on NR SL discovery transmission Philips International B.V. CR Rel-17 38.331 17.8.0 4834 - F NR\_SL\_enh-Core

R2-2405432 Correction on NR SL discovery transmission Philips International B.V. CR Rel-18 38.331 18.1.0 4835 - A NR\_SL\_enh-Core

[Nokia]: CR category is “D”.

* Agreed in R2-2405895 and R2-2405896 with the CR category change to “D”.

## 7.15 NR Sidelink evolution

(NR\_SL\_enh2; leading WG: RAN1; REL-18; WID: [RP-230077](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_99/Docs/RP-230077.zip))

Time budget: 0 TU

Tdoc Limitation: 2 tdocs

### 7.15.1 Organizational

Including incoming LSs and rapporteur inputs. CR rapporteurs are asked to continue maintaining an open issues list reflecting known issues to be handled during the maintenance phase.

R2-2404106 Reply to LS on IUC or DRX in co-channel co-existence (R1-2403573; contact: LGE) RAN1 LS in Rel-18 NR\_SL\_enh2-Core To:RAN2

* Noted.

R2-2404108 LS on CPE starting position for S-SSB in SL-U (R1-2403578; contact: OPPO) RAN1 LS in Rel-18 NR\_SL\_enh2-Core To:RAN2

[OPPO]: Already captured in the latest RRC CR.

* Noted.

R2-2404109 LS on updating RAN1 agreement about minimum time gap Z (R1-2403588; contact: Huawei) RAN1 LS in Rel-18 NR\_SL\_enh2-Core To:RAN2

[Huawei]: Already captured in the latest MAC CR.

* Noted.

### 7.15.2 Control plane corrections

Including RRC corrections and ASN.1 RILs. A single CR with miscellaneous corrections is requested; minor and editorial issues should be coordinated with the CR rapporteur and merged into the miscellaneous CR. Note RRC CR rapporteur’s summary and suggestion may be provided.

R2-2404167 Correction on Release-18 SL Evolution OPPO CR Rel-18 38.331 18.1.0 4646 2 F NR\_SL\_enh2 R2-2403930

* Endorsed.

R2-2404168 Left issues on RRC OPPO discussion Rel-18 NR\_SL\_enh2

Proposal 1 R2 confirm the configured carrier-set configuration for two RLC legs in case of PDCP duplication would not affect the usage of legacy-carrier before initial RRCReconfigurationCompleteSidelink message which confirms SL CA carrier(s) addition.

* Agreed.

R2-2404171 RIL list for R18 SL OPPO report Rel-18 NR\_SL\_enh2

* All “Agreed”, “PropAgreed” and “Rejected” are agreed.

R2-2404200 [O324] Allowed carrier indication upon carrier addition and release OPPO discussion Rel-18 NR\_SL\_enh2

Proposal 1 R2 discuss to capture the allowed-carrier indication to lower layer due to RRCReconfigurationCompleteSidelink message confirming SL CA carrier(s) addition/release into 5.8.9.1b.2.2 / 5.8.9.1b.1.2, and remove that in 5.8.9.1a.4.

[OPPO]: From RRC CR rapporteur point of view, carrier additions due to CA/PDCP duplication would be good to move to the dedicated section that already exists. With Xioami’s TP, it is still not clear whether PDCP duplication is enabled during SL link establishment. [Xiaomi]: Understands CA/PDCP duplication is not allowed during SL link establishment.

* Agreed with P1 in R2-2404200.

R2-2404574 Correction on TS 38.331 for SL Xiaomi discussion

Proposal 1: RAN2 to agree to clarify that the existing procedure to indicate the allowed carriers for the original RLC bearer for SRB applies to the case when PDCP duplication is not enabled.

Proposal 2: RAN2 to agree TP1 in Annex.

Proposal 3: For STCH, when duplication is configured, when the UE is in RRC\_IDLE / RRC\_INACTIVE / OOC, a UE can use any carrier within the super-set of <legacy carrier, and the carriers that the QoS flows of the unicast link associate with> but has to ensure the two RLC legs are not mapped to the same carrier.

Proposal 4: RAN2 to agree TP2 in Annex.

[OPPO, Apple]: Understand “a UE can use any carrier within the super-set of <legacy carrier, and the carriers that the QoS flows of the unicast link associate with>” is applicable only to SL SRB (not for DRB). [OPPO]: Can have offline discussion with Xiaomi. [Xiaomi]: After offline discussion, it was agreed to handle P1 and P2 as part of RRC CR preparation.

* P1 and P2 are handled as part of RRC CR preparation.

R2-2404216 [H162][H163] Discussion on RRC issues Huawei, HiSilicon discussion Rel-18 NR\_SL\_enh2

Proposal 1: [H162] RAN2 to confirm that SL CA can be applied when the PDCP duplication is not used.

Proposal 2: [H162] RAN2 to adopt TP1 in Annex if Proposal 1 is agreed.

[OPPO]: TP1 and proposal 1 are not aligned. “sl-AllowedCarriers” is configured for PDCP duplication. TP seems proposing SL carriers configured for PDCP duplication is used for CA purpose. Note there is condition specified this IE is only for PDCP duplication.

* Proposal 1 is confirmed.
* TP1 is not pursued.

Proposal 3: [H163] For RRC\_IDLE/INACTIVE UE, if SL C-LBT failure is detected for all the RB sets in RP with PSFCH and even there are still available RB set(s) in RP without PSFCH, SL RLF should be triggered for all UC connections configured with HARQenabled LCH(s).

Proposal 4: [H163] If proposal 3 is agreed, RAN2 to agree TP2 in Annex.

[Ericsson]: We can count on SL LBT recovery timer instead of SL RLF declaration.

* Not pursued.

R2-2404318 Discussion on remaining issue of TS 38.304 NEC Corporation discussion Rel-18 NR\_SL\_enh2

Proposal 1 It is suggested to capture the UE cell selection behaviour in TS 38.304 if the UE would like to perform V2X use case with multi-carrier.

Proposal 2 If propose 1 is agreed, it is suggested to adopt the corresponding TP.

* Noted. Companies can have more time to think if the current 304 is enough or not.

R2-2405230 [Z712][Z713]Discussion on control plane correction ZTE Corporation, Sanechips discussion Rel-18 NR\_SL\_enh2

Proposal 1 For SRB, legacy carrier is used if the SL-TxProfile of at least one associated QoS flow for the destination indicates backwardsCompatible, and adopt the TP-1 in Annex.

[OPPO]: Agree that the current text is not clear because TX Profile is only associated with GC/BC while SRB is associated with UC. Simple suggestion is to remove “where the carrier indicated in sl-FreqInfoList is used for the RLC bearer if the SL-TxProfile of at least one associated QoS flow for the sl-ServedRadioBearer indicates backwardsCompatible”.

* Agree to remove “where the carrier indicated in sl-FreqInfoList is used for the RLC bearer if the SL-TxProfile of at least one associated QoS flow for the sl-ServedRadioBearer indicates backwardsCompatible”

Proposal 2 Suggest to add “after receiving RRCReconfigurationCompleteSidelink”, and add”1/2/3” after SRB, adopt the TP-2 in annex clause.

* Agreed.

R2-2405857 Miscellaneous Rapporteur Stage 2 Corrections for NR Sidelink Evolution InterDigital CR Rel-18 38.300 18.1.0 0838 2 F NR\_SL\_enh2 R2-2403926

* Endorsed.
* [POST126][101][V2X/SL] (OPPO)

**Scope:** To capture all agreements into 38.331.

**Intended outcome:** Approve RRC CR in R2-2405899.

**Deadline:** Short email discussion.

* [POST126][103][V2X/SL] (IDC)

**Scope:** To capture all agreements into 38.300.

**Intended outcome:** Stage 2 CR in R2-2405901.

**Deadline:** Short email discussion.

### 7.15.3 User plane corrections

Including MAC corrections. A single CR with miscellaneous corrections is requested; minor and editorial issues should be coordinated with the CR rapporteur and merged into the miscellaneous CR. Note RRC CR rapporteur’s summary and suggestion may be provided.

R2-2404838 Correction on Release-18 Sidelink evolution LG CR Rel-18 38.321 18.1.0 1830 1 F NR\_SL\_enh2-Core R2-2403931

[ZTE]: Tick is missed for “Other specs affected”.

* Tick for Y for Other core specifications, and N for others.
* Endorsed in R2-2405897 with the change above.

R2-2405685 Summary on user plane corrections LG Electronics Inc. discussion NR\_SL\_enh2 Late

* Noted. We’ll take them into account for discussion.

**TP for SL CSI Reporting MAC CE:**

R2-2404357 Correction on Sidelink CSI reporting MAC CE LG Electronics Inc. discussion Rel-18 38.321 NR\_SL\_enh2

Adding related UE behaviour in 5.22.1.11 (TX carrier selection)?

[Xiaomi]: Wonder why there is a case TX carrier selection is triggered for SL CSI reporting MAC CE? [LG]: In the current specification, TX carrier selection is triggered when SL grant is generated. It’s aligned with the current specification structure. [OPPO, Vivo]: Prefer simple spec impact, i.e. not capturing it into TX carrier selection. The consequence would be the UE may not get a grant for SL CSI reporting MAC CE. [Lenovo, Toyota]: If the UE may not get a grant for SL CSI reporting MAC CE, why we agreed per carrier SL CSI reporting MAC CE? It is quite natural to consider it in TX carrier selection.

* Add related UE behaviour in 5.22.1.11 (TX carrier selection). TP in R2-2404357 is baseline, but the detailed wordings can be further discussed in CR preparation.

Whether CBR condition is applied for SL CSI reporting MAC CE transmission?

[LG]: CBR condition is not needed. [Nokia]: Prefer applying the existing CBR condition to SL CSI reporting MAC CE also. However, we don’t have CBR threshold for MAC CE transmission now, which we need further discussion how to configure the corresponding threshold. [Huawei]: For SL CSI reporting MAC CE, there is only single carrier. Even though CBR condition is not met, there is no other candidate carrier for it. It is good either CBR condition is not applied or leaves it to UE implementation. [Ericsson]: Agree with LG given SL CSI reporting MAC CE is small enough. [OPPO]: If CBR condition is not applied, does it include a case SL CSI reporting MAC CE is embedded with a STCH? [ZTE]: With the current spec, CBR condition is already checked in LCP, which means if MAC CE is included with a STCH, it already means CBR condition is met. [Lenovo]: Agree with ZTE.

* CBR condition is not applied for standalone SL CSI reporting MAC CE.

Adding related UE behaviour in 5.22.1.7

* Add related UE behaviour in 5.22.1.7

[Nokia]: Whether the UE behaviour is per carrier and/or the timer maintenance is per carrier?

Whether the existing UE behaviour is updated to specify it’s per carrier operation?

* Yes. The detailed wording can be further discussed in CR preparation

Whether the *sl-CSI-ReportTimer* is maintained per carrier?

* Yes.

Note 2 is removed in 5.22.1.7?

* Yes.

Adding related restriction to LCP

[Huawei, Nokia]: Consider it’s an essential aspect to make sure per carrier CSI reporting MAC CE. [Ericsson, Apple, IDC, Qualcomm, LG]: Without LCP change, it still works. Prefer no LCP change.

* No LCP change.

[Ericsson]: We may send LS to inform RAN2 agreements to RAN1. [Nokia, OPPO]: The ball has been passed to RAN2. No specific RAN1 action is expected from RAN2 point of view. No need of the LS to RAN1.

* No LS to RAN1.
* Coordinate with RAN1 delegates internally (e.g. decision on sl-CSI-ReportTimer per carrier).

R2-2404217 Correction on SL CSI reporting MAC CE Huawei, HiSilicon discussion Rel-18 NR\_SL\_enh2

R2-2404358 Discussion on CSI report for Carrier Aggregation SHARP Corporation discussion NR\_SL\_enh2-Core

R2-2404385 SL CSI report Nokia discussion NR\_SL\_enh2

R2-2405232 Discussion on specification impact on SL CSI report ZTE Corporation, Sanechips, Ericsson discussion Rel-18 NR\_SL\_enh2

**Re-evaluation and pre-emption for MCSt:**

R2-2404210 Remaining issue on Re-evaluation/Pre-emption for MCSt CATT discussion

Proposal 1: Specify how MAC entity shall determine the number of consecutive slots used for re-evaluation or pre-emption in the MCSt case by down-selecting the following two options:

 Option 1: Only the resources in the first slot or the resources in all the slots of the Multi-consecutive slots transmission shall be re-evaluated or checked for pre-emption;

 Option 2: Only the resources in the first or last M consecutive slots shall be re-evaluated or checked for pre-emption.

Proposal 2: Specify the agreed option in Proposal 1 via normative texts in subclause 5.22.1.2a in MAC Spec.

P2 in R2-2404169

Proposal 2 R2 not pursue P2 in R2-2403047.

[CATT]: Do not see any compatibility issue. [LG]: In the current specification, which resource to be selected for re-evaluation and pre-emption is up to implementation. Do not see why we need to change it now. [CATT]: MCSt has new characteristics, which should be new compared to R16.

* P2 in R2-2404169 is agreed.

P2 in R2-2404892

Proposal 2a. For Multi-consecutive slots transmission on unlicensed band, if the UE succeeds in LBT for any anterior slot within the MCSt, the MAC layer does not perform resource reselection upon reception of the re-evaluation/pre-emption indication from the PHY layer for the remaining slots within the MCSt for maintaining the channel occupancy.

Proposal 2b. Adopt the TP2 in TS 38.321 for proposal 2a.

[OPPO]: It seems against the resource re-evaluation and pre-emption. Now, if the resource is reselected after re-evaluation/pre-emption, the resource is used for retransmission, but the proposal is not to use it if it was Acked. [Qualcomm]: For multi-slots MCSt, we should fill all TBs. If we break the rule, we need to ask RAN1. [OPPO]: Understand the proposal is for the case a slot was Acked, re-evaluation or pre-emption was already done, then resource reselection is not triggered for the slot, which is against the current relation between re-evaluation/pre-emption and resource reselection. [Xiaomi]: Feel sympathy, but consider a different way-out, e.g. UE needs to retransmit using the slot after re-evaluation/pre-emption only when a condition is met.

* Noted.

**HARQ A/N for GC and PSFCH resources:**

P4 in R2-2405231 (ZTE)

Proposal 4 It’s up to UE implementation to determine the number of candidate PSFCH resources, and adopt the TP-4 in annex clause.

P2 in R2-2404218 (Huawei)

Proposal 2: No spec impact is needed as such issue can be avoided by NW implementation (i.e. NW can configure same number of candidate PSFCH resource for different PSFCH occasions).

* P2 in R2-2404218 is agreed.

**SL LBT Failure reporting:**

P1 in R2-2404218 (Huawei)

Proposal 1: RAN2 to discuss the following options to ensure that SL LBT failures are able to be reported:

 To define the start point for evaluating “SL LBT failure MAC CE(s) has not been generated”. The corresponding TP is provided in Annex – TP1 (option 1).

 UE evaluates whether the SL LBT failure MAC CE for a certain RB set has not been generated, and consider SL LBT failure MAC CE for the RB set has not been generated after the SL C-LBT failure is recovered. The corresponding TP is provided in Annex – TP2 (option 2).

P1 in R2-2404497 (Ericsson)

Proposal 1 For SL LBT failure report in case of Mode 2, no further spec change is pursued.

[Nokia, Lenovo, LG]: Agree with Huawei. There is an issue to be fixed. [LG]: Prefer TP2. Wonder if “(s)” is still needed to cover multiple MAC CEs. [Lenovo]: We can simply update the condition as follow then we don’t need a second sentence in TP2. “1> if SL consistent LBT failure has been triggered, and not cancelled, in the RB set(s), and SL LBT failure MAC CE for the triggered SL LBT Failure has not been generated;”

* Update the condition in 5.31.2 as follow.

“1> if SL consistent LBT failure has been triggered, and not cancelled, in the RB set(s), and SL LBT failure MAC CE for the triggered SL LBT Failure has not been generated;”

**Configuration of both IUC and Co-Ex:**

P3 and P4 in R2-2404169 (OPPO)

Proposal 3 For co-configuration of IUC scheme-1 and Co-Ex, revise TS 38.321 clause 5.22.1.1, so that for preferred-resource + full-sensing case, UE firstly select resource, following the additional requirement for Co-Ex, within the intersection between IUC preferred resource and full sensing resource candidates reported by lower layer, if available. Otherwise (if no available resource in the intersection), UE perform resource selection by ignoring IUC preferred resource filtering.

[OPPO]: In addition to proposal 3, clarify actually we also need to consider preferred resource + random selection. [LG]: In the current MAC, there are so many if conditions that are related to IUC and Co-Ex. Think it is not easy to change whole parts of MAC. [Vivo]: It is good to see the changes before the next meeting. [LG]: Can prepare TP and share it before the next meeting.

* Will be revisited next meeting. MAC CR rapporteur will prepare the corresponding MAC changes for both IUC + Co-Ex and DRX + Co-Ex, then we can determine whether RAN2 spec impacts are acceptable or not. If it needs to introduce a new functional change, we may not support them.

Proposal 4 For co-configuration of IUC scheme-2 and Co-Ex, revise TS 38.321 clause 5.22.1.2b, so that UE select resource within the full sensing resource candidates reported by lower layer following the additional requirement for Co-Ex, by excluding the conflict resource(s) for the removed resource.

**Co-Ex Correction:**

R2-2404496 Correction to resource selection for LTE-NR cochannel scenario Ericsson, LG Electronics Inc. CR Rel-18 38.321 18.1.0 1807 1 F NR\_SL\_enh2 R2-2402946

[Toyota]: “randomly the time and frequency resources” should be changed to “randomly select the time and frequency resources”

* “randomly the time and frequency resources” is changed to “randomly select the time and frequency resources”
* Agreed in R2-2405898 with the change above.

**Others:**

P4 and P5 in R2-2404218 (Huawei)

Proposal 4: When the MAC entity selects carrier(s) among the candidate carriers with increasing order of CBR from the lowest CBR, it can skip CCs that would cause the aggregated bandwidth to exceed UE capability once selected, and continue with selecting carriers among other candidate carriers with increasing order of CBR.

Proposal 5: If proposal 4 is agreed, RAN2 to adopt TP3 for TS 38.321.

[OPPO, Nokia]: We haven’t captured any RF capability restriction. Consider the note “ NOTE 2: It is left to UE implementation how many carriers to select based on UE capability.” is already helpful.

* Not pursued.

P1 and P2 in R2-2404319 (NEC)

Proposal 1 Not support the feature of LTE Uu control NR sidelink for both SL-U and SL-CA.

Proposal 2 It is suggested to agree the corresponding TP1 and TP2.

[Session chair]: Existing LTE ASN.1 or configuration can support SL-U or SL-CA? [NEC]: For SL-U, the UE needs to report some SL-U related information. [Qualcomm]: For LTE Uu controlled NR SL, both mode 3 and mode 4 are supported while for NR SL CA, only mode 2 is supported. [Huawei]: Agree with proposal 1.

* Proposal 1 is agreed.
* TPs in R2-2404319 are baseline, but leaves detailed wordings to MAC CR rapporteur.

R2-2404320 Clarification on SL DRX RTT timer for SL-U SHARP Corporation discussion Rel-18

[LG]: There is some typo in TP.

* TP is agreed, and detailed wordings is up to MAC rapporteur.

P7 and P8 in R2-2404575 (Xiaomi)

Proposal 7: RAN2 to agree to delete the corresponding description on sl-lbt-FailureDetectionTimer upon BWP deactivation.

Proposal 8: RAN2 to agree with TP3 in Annex.

* TP3 is agreed.

P1 and P2 in R2-2405231 (ZTE)

Proposal 1 If legacy carrier is indicated to be used by upper layer, UE should select legacy carrier directly without taking the CBR restriction into account, and adopt the TP-1.

[OPPO]: In LTE V2X CA, it was discussed and the conclusion was not to handle special handling. [ZTE]: Backward compatibility was not there in LTE V2X CA. [OPPO]: There was similar issue to security message in LTE V2X CA. [CATT]: Share the intention. Alternative way is to exclude legacy carrier from TX carrier (re)selection if certain condition (e.g. before SL link establishment) is met. [CATT]: Before SL link establishment, upper layer may indicate only legacy carrier, then there would be no issue. [Session chair]: What will happen if CBR condition is not met for the legacy carrier? [CATT]: Then the UE will not perform transmission on the legacy carrier. [Session chair]: Ok, then it may work in different direction compared to the proposal. [Xiaomi]: Last meeting, we discussed if the carrier for QoS flow is not met, it was decided we’ll inform it to the upper layer. Assume the situation is similar. No need of special handling for legacy carrier. [CATT]: It’s ok to note it this meeting, but since this meeting is the last meeting for ASN.1, we need to be careful to introduce new parameter(s) from the next meeting.

* Noted.

Proposal 2 Add the parameter of sl-AllowedCarriers in the clause 5.22.1.4.1.1 to align the description in RRC and MAC specification, and adopt the TP-2.

* TP-2 is agreed.

P3 in R2-2405231 (ZTE):

Proposal 3 Delete the description of carrier mapping restrictions for destination selection if the UE is configured with SL relay discovery or A2X communication related resource pool, correct typo, and adopt the TP-3.

[LG]: Ok to delete most of them, but NOTE 0 should be kept since it is also applied to SL communication.

* TP-3 is agreed (with keeping NOTE 0)

P5 in R2-2405231 (ZTE):

Proposal 5 Add “associated to the LCID” in sidelink RLC entity establishment clause, agree the draft CR-4 in Annex.

[Huawei, NEC]: Think “corresponding” already means “associated to the LCID”.

* Noted.

R2-2405462 Discussion on carrier selection for SL MAC CE(s) LG Electronics Inc. discussion NR\_SL\_enh2

=> Revised in R2-2405698

R2-2405698 Discussion on carrier selection for SL MAC CE(s) LG Electronics Inc. discussion NR\_SL\_enh2

Proposal 1-1. UE selects a carrier on which the SL IUC Request was received as a carrier for transmission of a SL IUC Information MAC CE.

Proposal 1-2. Carrier selection of SL IUC Request MAC CE, Condition based SL IUC Information MAC CE and SL DRX command MAC CE uses the same procedure as the carrier selection procedure of logical channel data.

[Lenovo, Ericsson]: For P1-2, we don’t need any new thing. For P1-1, we can consider similar approach as SL CSI reporting MAC CE. [Vivo]: Support the P1-1 and P1-2. [Apple]: We need to be careful on the determined carrier for IUC since IUC was mainly led by RAN1. [Lenovo]: For P1-2, without this additional change, it can still work with some delay. We had some special handling for SL CSI reporting MAC CE because it is sensitive to delay. Not sure for others. [LG]: In the current MAC, if the grant already configured is not enough to add MAC CE, MAC will generate new grant for MAC CE transmission and it can trigger TX carrier (re)selection. If we follow what Lenovo mentioned, it is not aligned with the current MAC.

* P1-1 is agreed.
* Revisit P1-2 next meeting.
* [POST126][102][V2X/SL] (LG)

**Scope:** To capture all agreements into 38.321.

**Intended outcome:** Approve MAC CR in R2-2405900.

**Deadline:** Short email discussion.

R2-2404169 Left issues on MAC OPPO discussion Rel-18 NR\_SL\_enh2

R2-2404218 MAC corrections for SL evolution Huawei, HiSilicon discussion Rel-18 NR\_SL\_enh2

R2-2404319 Discussion on remaining issue of TS 38.321 NEC Corporation discussion Rel-18 NR\_SL\_enh2

R2-2404497 Discussion on remaining UP issues Ericsson discussion Rel-18 NR\_SL\_enh2

R2-2404575 Correction on TS 38.321 for SL Xiaomi discussion

R2-2404892 Discussion on re-evaluation and pre-emption check for MCSt vivo discussion Rel-18

R2-2405228 On group size and PSFCH occasions for SL-U Nokia discussion NR\_SL\_enh2

R2-2405231 Discussion on remaining issues on user plane for SL evo ZTE Corporation, Sanechips discussion Rel-18 NR\_SL\_enh2

## 8.5 Network Energy Saving Enh.

(Netw\_Energy\_NR\_enh-Core; leading WG: RAN1; REL-19; WID: [RP-240170](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_103/Docs/RP-240170.zip))

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.5.1 Organizational

LS, Rapporteur input, including workplan, etc.

R2-2404121 LS on the conditions for triggering UL WUS transmission to request on-demand SIB1 (R1-2403779; contact: MediaTek) RAN1 LS in Rel-19 Netw\_Energy\_NR\_enh To:RAN2

* Noted.

### 8.5.2 On-demand SSB SCell operation

Scenarios/use cases, RAN2 spec impacts and high-level solutions.

R2-2404170 Discussion on On-Demand SSB OPPO discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404201 Discussion on on-demand SSB for NES Ericsson discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404227 On-demand SSB SCell Operation Samsung discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404261 RAN2 impacts to enable on-demand SSB SCell Intel Corporation discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404576 Discussion on on-demand SSB Xiaomi discussion

R2-2404633 Discussion on RAN2 work of on-demand SSB for Scell Apple discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404821 Issues on the procedure of on-demand SSB SCell operation Lenovo discussion Rel-19

R2-2404857 Further consideration on on-demand SSB SCell operation in connected mode ZTE Corporation, Sanechips discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404893 Discussion on on-demand SSB SCell operation vivo discussion Rel-19

R2-2404909 On-demand SSB Scell operation discussion Sony discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404931 Discussion on on-demand SSB SCell operation Spreadtrum Communications discussion Rel-19

R2-2404949 Consideration on on-demand SSB SCell operation CATT discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405034 Discussion on on-demand SSB SCell operation CMCC discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405076 Discussion on On-demand SSB for SCell NEC discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405122 Discussion on on-demand SSB SCell operation for NES Huawei, HiSilicon discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405138 On demand SSB transmission for SCell InterDigital discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405225 On-demand SSB SCell operation LG Electronics Inc. discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405289 Discussion on on-demand SSB SCell operation Fujitsu discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405294 Discussion on On-demand SSB SCell Operation Qualcomm Incorporated discussion

R2-2405310 On-demand SSB SCell operation China Telecom discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405566 On demand SSB handling Nokia discussion Rel-18 Netw\_Energy\_NR\_enh-Core

R2-2405660 Discussion on on-demand SSB procedure Quectel discussion Rel-19 Late

### 8.5.3 On-demand SIB1

Any further consideration on scenarios/use cases, UL WUS configuration, triggering conditions the UE to request on-demand SIB1, procedure of on-demand SIB1 request by RACH, other impacts on RRC idle/inactive UEs (including cell barring, etc.), any impact on RRC connected UEs, etc.

**1. Scenario 1a (case 2 in RAN1)**

**- Further scenario clarification (P1: R2-2404213: Ericsson, P2: R2-2404634: Apple)**

Proposal 1: Study on-demand SIB1 provisioning for NES Cell(s) in versions of Scenario 1a with multiple Cells A and/or NES Cells:

1. More than one Cell A may provide configuration for the same NES cell.
2. The same Cell A may assist more than one NES Cells.

* Agreed.

[Intel, Huawei, Samsung]: Support the proposal. [Vodafone]: Understand if NES cell is the same cell, same WUS configuration will be configured even though it is configured by multiple cells A. [Apple]: NW implementation will ensure it.

Proposal 2 (modified): RRC release message assisted intra-cell WUS can be discussed as option of signaling details in stage 3.

* Agreed.

[LG]: Once RRC release message was transmitted, if the information is updated, how to update the UE of the latest WUS configuration? [Xiaomi]: If RRC release message includes the same WUS configuration as SIB, why not counting on SIB? [Huawei, Nokia]: Understand RRC release based option is supplementary option on top of SIB. [Apple]: Agree that it is supplementary option to reduce signalling overhead due to periodic SIB transmission, however WUS configuration is same as the one in SIB. [KDDI]: Think it is a kind of optimization, so we can discuss it later.

**- Information of WUS configuration (P2: R2-2404213: Ericsson, P2: R2-2405295: Qualcomm)**

Proposal 2 (modified): Can use the PCI and frequency of a NES Cell to associate the UL WUS configuration with a NES Cell.

* Agreed.

[Huawei]: Proposal 2 is aligned with RAN2 agreement last meeting. [Apple, ZTE]: Even for single NES cell, WUS configuration needs to be associated with PCI and frequency.

Proposal 2 (modified). For Message 1 based on-demand SIB1 request, the on-demand SI request configuration that currently included in SIB1 may be used as the design baseline.

* Agreed.

**- Transmission of WUS configuration (P9a, P9b: R2-2404153: Xiaomi)**

Proposal 9a (modified): Cell A’s SIB can be used to configure on-demand SIB1 related configuration for neighbour NES cells, e.g., via new SIB or the existing SIB.

* Agreed.

[Lenovo]: Why not configure in the legacy SIBs (e.g. SIB3/4)? [NEC]: The UE needs to check new SIB whenever cell reselection happens? Wording “For cell reselection” gives some confusion.

Proposal 9b (modified): After the UE camps on NES cell, UE can acquire WUS configuration from the NES cell.

* Postponed.

[Session chair]: Understand the scenario is the UE reselected from cell A to NES cell. While UE stays in the NES cell, the UE may need to re-acquire SIB1. Then the question is how the UE gets WUS configuration? E.g. performs cell reselection to cell A and reacquires WUS configuration or reacquire from NES cell itself? [Rakuten]: If NW tries to transmit SIB1 always to guarantee 3 hours invalidity, how NW can have energy saving? [Nokia]: Understand NES cell does not transmit SIB1, then how its SIB1 can be transmitted to cover this concern?

**- Triggering condition of WUS transmission (P3-P4.2: R2-2404262: Intel, P9: R2-2405619: Huawei)**

Proposal 4 (modified): (1) If the UE chooses the NES cell using legacy intra-F/inter-F cell re-selection procedure (as baseline), the UE triggers WUS transmission.

* Agreed.

[Lenovo]: Does the proposal include both cell selection and cell reselection? For cell selection, cell A is not available. [OPPO]: Understands 3) is applied before camping the NES cell. [Nokia]: With the previous agreement, if RRC release is used, cell selection needs to be also covered.

Proposal 4.1 (modified): After UE successfully receives OD-SIB1 for that NES Cell and if it is a suitable cell, UE camps in the NES Cell “similar” to a legacy Cell.

* Agreed.

[Nokia]: The UE will receive paging and updated system information in NES cell after camping there? [Lenovo]: Yes, and the question would be how long the UE performs them.

Proposal 9: In addition to the already agreed conditions (i.e. UE doesn’t have a valid SIB1, the cell doesn’t broadcast SIB1 and supports on-demand SIB1) introduce a new RSRP triggering condition for the NES UE to be allowed to send WUS to trigger on-demand SIB1. FFS what is the triggering condition and whether the triggering condition is a new threshold.

[Samsung, Xiaomi, OPPO, NEC, Lenovo]: Think the existing cell reselection criterion is enough. [Nokia]: May be useful, but reluctant to agree with them now. We can discuss it in stage 3. [ZTE]: Support the proposal. It is good for NW is allowed to configure separate threshold than cell reselection criterion threshold. [LG]: Current cell reselection criterion is not absolute threshold, it’s relative to the serving cell’s radio condition. Support the proposal. [IDC]: If we have new threshold and the threshold is not met, anyway the existing cell reselection criterion should be used to trigger WUS transmission. [Vivo]: With the new threshold, it will make UE behaviour more complicated. We need to consider many combination cases, e.g. new threshold is {met, not met} + existing cell reselection criterion is {met, not met}. [Samsung]: Rather discussing whether new threshold is required or not, it’s better to discuss whether we’ll allow earlier or later WUS transmission triggering (than cell reselection criterion). The UE may achieve it w/o new threshold. [Apple]: Seems each company has different understanding on the use of the threshold. It’s good to see overall companies’ understanding on how the threshold is used or works.

**- UE request SIB1 to perform initial access in NES cell (P8: R2-2404449: Fujitsu)**

Proposal 8 (modified): RAN2 not to support on-demand SIB1 request that is combined with an initial access to perform RRC connection establishment/resume on the NES cell.

* Agreed.

**- Legacy UE impact (P4, P5: R2-2405049: OPPO)**

Proposal 4: NW need to bar the legacy UE from accessing the on-demand SIB1 cell (e.g. based on the existing barring mechanism).

* Agreed.

[CATT]: Ok with the proposal, however to use ssb-SubcarrierOffset needs RAN1 confirmation.

Proposal 5: RAN2 discusses how to avoid the legacy UE camping at the Cell A frequency attempting to switch to the NES Cell frequency (but allowing the R19 NES UE to do that).

**- Barring relaxation for R19 NES UE (P8: R2-2404634: Apple)**

Proposal 8: Relax the existing UE behavior if the UE is unable to acquire the SIB1 of NES Cell, i.e., the NES cell is not regarded as barred if it doesn’t broadcast SIB1 before UE initiates OD-SIB1 procedure.

**- Paging and SIB1 update in NES cell (P7: R2-2404634: Apple)**

Proposal 7: After Rel-19 UEs camp in NES cell, it can receive paging and SIB1 update in NES cell as legacy camped normally state.

**- RAR monitoring for MSG1 based OD-SIB1 REQ (P2: R2-2405275: NEC)**

Proposal 2: RAN2 to assume the UE is expected to receive the RAR responding to the preamble transmission for Msg1-based on-demand SIB1 procedure.

**- UE behaviour if RACH failure of OD-SIB1 REQ (P12: R2-2404634: Apple)**

Proposal 12: Upon RACH failure of OD-SIB1 request, specify when the UE regards OD-SIB1 can’t be acquired in the NES cell and considers it as barred.

**2. Scenario 3 (case 1 in RAN1) (P1: R2-2405619: Huawei)**

Proposal 1: RAN2 to wait for RAN1’s progress whether to support scenario 3.

**3. Case 3 in RAN1 (P1: R2-2404226: Samsung)**

Proposal 1: RAN2 to consider the scenario where SIB1 of Cell B can be directly obtained from Cell A; Cell A provides SIB of Cell B as a container in a new SIB (say SIB X of Cell A); UE requests for SIB X using the legacy SI request mechanism.

R2-2404153 Discussion on on-demand SIB1 Xiaomi discussion Rel-19

R2-2404213 Discussion on on-demand SIB1 for NES Ericsson discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404226 On-demand SIB1 Samsung discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404262 UE behaviour when (re)selecting to a NES Cell including further solution details and scenarios to support OD-SIB1 Intel Corporation discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404449 Discussion on on-demand SIB1 transmission for network energy savings Fujitsu Limited.. discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404458 Scenarios, configuration, and camping Lenovo discussion Netw\_Energy\_NR\_enh-Core

R2-2404565 Discussion on scenarios and procedure of on-demand SIB1 HONOR discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404634 Further discussion on on-demand SIB1 Apple discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404829 Discussion on on-demand SIB1 for NES Rakuten Mobile, Inc discussion Rel-19

R2-2404858 Further consideration on on-demand SIB1 in idle and inactive mode ZTE Corporation, Sanechips discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404886 Discussion on the scenarios for on-demand SIB1 Google Inc. discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404894 Discussion on on-demand SIB1 for RRC IDLE and INACTIVE UE vivo discussion Rel-19

R2-2404910 UL WUS for on-demand SIB1 Sony discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404911 On-demand SIB1 for IDLE/INACTIVE UEs Sony discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404950 Consideration on on-demandSIB1 issues CATT discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405035 Discussion on on-demand SIB1 CMCC discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405049 Consideration on on-demand SIB1 OPPO discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405136 On-demand SIB1 request and reception InterDigital discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405226 On-demand transmission of SIB1 LG Electronics Inc. discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405275 Discussion on On-demand SIB1 and RACH handling NEC Telecom MODUS Ltd. discussion

R2-2405295 Discussion on On-demand SIB1 Qualcomm Incorporated discussion

R2-2405311 On-demand SIB1 for UEs in idle/inactive mode China Telecom discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405356 Discussion on on-demand SIB1 Sharp discussion

R2-2405552 Discussion on on-demand SIB1 for NES CEWiT discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405567 On demand SIB1 handling Nokia discussion Rel-18 Netw\_Energy\_NR\_enh-Core

R2-2405611 On-demand SIB1 for NES Fraunhofer IIS discussion Rel-19

R2-2405619 Discussion on on-demand SIB1 operation for NES Huawei, HiSilicon discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405640 On-demand SIB1 for Idle/Inactive mode UEs III discussion Netw\_Energy\_NR\_enh

### 8.5.4 Adaptation of common signal/channel transmissions

Further consideration of adapation of paging occasions in time domain, legacy UE impact (including barring aspect for paging adaptation), configuration aspect for paging adaptation, RAN2 spec impact and solutions for RACH adaptation (with consideration of RAN1 progress, note study of RACH adaptation in spatial domain needs to be concluded), etc.

**1. RACH adaptation in spatial domain (P8: R2-2404577: Xiaomi)**

Proposal 8: RAN2 to wait for RAN1 conclusion on the evaluation of NES gain of PRACH adaptation in spatial domain.

**2. Paging adaptation**

* [POST126][104][NES] (Apple)

**Scope:** phase 1 - identify and understand each different option, phase 2 – discuss pros and cons for each option

**Intended outcome:** discussion summary

**Deadline:** Long email discussion.

R2-2404183 Discussion on adaptation of common signal/channel transmissions OPPO discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404228 Adaptation of common signal/channel transmissions Samsung discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404263 RAN2 impacts to enable adaptation of paging and RACH in time Intel Corporation discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404349 Adaptation of common signal or channel Fujitsu discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404566 Discussion on adaptation of common signal/channel transmissions HONOR discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404577 Discussion on common signal adaptation Xiaomi discussion

R2-2404635 Further discussion on RAN2 work of common signal transmission adaptation Apple discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404822 Paging and PRACH adaptation for NES operation Lenovo discussion Rel-19

R2-2404851 Discussion on the paging occasion adaptation ITRI discussion Netw\_Energy\_NR\_enh-Core

R2-2404859 Further consideration on paging occasion adaptation ZTE Corporation, Sanechips discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2404895 Discussion on adaptation on common signal transmissions vivo discussion Rel-19

R2-2404932 Discussion on adaptation of common signal/channel transmissions Spreadtrum Communications discussion Rel-19

R2-2404951 Consideration on adaptation of common signalchannel transmissions CATT discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405036 Discussion on adaptation of common signalchannel transmissions CMCC discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405123 Discussion on adaptation of common signal/channels transmissions Huawei, HiSilicon discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405137 Time domain adaptation of common signalling and channels InterDigital discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405276 Paging enhancements and legacy UE barring NEC Telecom MODUS Ltd. discussion

R2-2405290 Adaptation of common signal/channel transmissions for NES Ericsson discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405296 Discussion on Adaptation of Common Signal/Channel Transmissions Qualcomm Incorporated discussion

R2-2405428 Discussion on paging adaptation ASUSTeK discussion Rel-19 Netw\_Energy\_NR\_enh-Core

R2-2405568 Common signal aspects of NES WI Nokia discussion Rel-18 Netw\_Energy\_NR\_enh-Core

R2-2405576 Discussion on adaptation of paging signal/channel III discussion

R2-2405621 Adaptation of Common Signals and Channels for NES Fraunhofer IIS discussion Rel-19

R2-2405694 Discussion on common signal and channel adaptation LG Electronics Inc. discussion Rel-19 Netw\_Energy\_NR\_enh

## 8.6 Mobility Enhancement Ph4

(NR\_Mob\_Ph4-Core; leading WG: RAN2; REL-19; WID: [RP-240299](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_103/Docs/RP-240299.zip))

Time budget: 2 TU

Tdoc Limitation: 2 tdocs

### 8.6.1 Organizational

LS, Rapporteur input, including workplan, etc.

### 8.6.2 Inter-CU LTM

Any further consideration on scenarios/use cases, signalling flows, spec impacts and solutions in LTM preparation phase (e.g. to what extend the RRC procedure, RRC modeling, reference configuration of R18 can be reused, etc.), early sync phase, and LTM cell switch execution phase, any further consideration on security key handling, and details on subsequent inter-CU LTM and subsequent intra-CU LTM after an inter-CU or intra-CU LTM switch, etc.

**1. Scenarios**

**- Clarification of DC (P1: R2-2404464: Ericsson)**

Proposal 1: An LTM configuration with inter-CU LTM candidate cells can be configured either by the MCG or SCG (but not for both simultaneously) and it is up to the network to handle this (further details up to RAN3, if any). No restriction for intra-CU LTM candidate cells.

* Agreed.

[CMCC]: RAN3 has already agreed with P1 last meeting. [CATT]: If configuration includes mixture of intra-CU and inter-CU LTM candidate cells? At least inter-CU LTM candidate cell is included, it is configured either by MCG or SCG. [Huawei]: No stage 3 RAN2 impact from P1? [Ericsson]: Confirms no. [ZTE]: Understand if MN configures both inter-CU and intra-CU LTM, it would impact SN. However, if SN configures inter-CU, it would not impact on MN.

**- Xn-based and N2-based inter-CU LTM (P1: R2-2404421: Vivo)**

Proposal 1 (modified): Xn-based inter-CU LTM is prioritized in Rel-19.

* Agreed.

**2. Stage-2 signaling flows and procedures**

**- Stage-2 signaling flows (Figure 2, P2-P4: R2-2405062: ZTE)**

Proposal 2 (modified): The preparation of inter-CU LTM configuration is initiated by the source gNB-CU.

* Agreed.

[Ericsson]: For the figure 2, it is still under discussion whether one message is used for each candidate cell or for each candidate CU.

Proposal 3: For each candidate cell, the preparation of lower layer configuration is initiated by the candidate gNB-CU, based on the LTM request from the source gNB-CU. RAN2 assumes the interaction between the candidate gNB-CU and candidate gNB-DU follows the same signaling procedure for intra-CU LTM.

* Agreed.

Proposal 4: The source gNB-CU is responsible to collect the configurations and information of candidate cells from multiple candidate gNB-CUs and generates the common CSI resource configuration for L1 measurement on candidate cells.

* Agreed.

Proposal 5 (modified): In order to support subsequent LTM, the source gNB-CU needs to inform the candidate gNB-CU(s) about the common CSI resource configuration and the collected information of candidate cells from multiple candidate gNB-CUs. The candidate gNB-CU(s) responds with the candidate configuration to the source gNB-CU accordingly (if needed).

* Agreed.

**3. Preparation**

**- RRC Configuration/structure (P9: R2-2405062: ZTE)**

Proposal 9: The RRC signalling structure and modelling for Rel-18 LTM is taken as the baseline for inter-CU LTM.

* Agreed.

**- LTM Candidate ID (P5: R2-2404165: CATT)**

Proposal 5: For inter-CU LTM, LTM candidate ID is unique across all the participating gNB-CUs.

* Agreed.

**- Max number of LTM candidate IDs (P2: R2-2404464: Ericsson)**

Proposal 2: The maximum number of LTM candidate cell configuration is 8, regardless of whether these are intra-CU or inter-CU LTM candidate configurations.

* Agreed.

**- Reference configuration**

**Single reference configuration as Rel-18 LTM (P3: R2-2404642: Apple, China Telecom)**

Proposal 3: A single reference config is used for inter-CU LTM, and this reference configuration is the same as Rel-18 reference configuration. RAN2 expects additions to the Rel-18 reference configuration structure for Rel-19 LTM.

**Multiple reference configuration, e.g. a reference configuration per CU (P5: R2-2404826: LG)**

Proposal 5. Multiple reference configurations are provided per CU for inter-CU LTM.

[Ericsson]: Single reference configuration sounds simpler, but each CU may have different capabilities or default configurations. We need to see each solution’s pros and cons. [Rakuten]: Considering one CU covers many DUs, two reference configurations should be enough. [MediaTek]: Considering max 8 candidate cells, one reference configuration should be enough. [Qualcomm]: It is not easy to determine which one is better in the signalling overhead. It will be different case by case. [KDDI]: We don’t need coordinate with multiple CUs if we have multiple reference configurations, e.g. one reference per CU. [Huawei]: Don’t agree with KDDI. Even with single configuration, the source CU doesn’t need the coordination with others. [Nokia]: With the mixture of subsequent inter-CU and intra-CU LTM, a reference configuration per CU will reduce the signalling overhead in the end.

**4. Early sync**

**- RAR based option (P1: R2-2405037: CMCC, P5: R2-2404421: Vivo)**

Proposal 1 (modified): RAR-based TA acquisition is not supported for inter-CU LTM for non-conditional LTM. FFS on conditional LTM.

* Proposal 1 is agreed.

Proposal 5: Early RACH with RAR is supported for inter-CU LTM.

[CATT, Lenovo]: If early TA acquisition is started earlier than 20ms, it doesn’t bring any problem. Note RAR based solution was discussed in R18 and it was excluded in the end. [Vodafone]: Where 20ms delay comes from? [Samsung]: If we introduce RAR based option for conditional LTM, are we going to block use of RAR based option for inter-CU LTM? [OPPO]: If RAR is received from the source-CU, it will anyway have 20ms delay. If RAR is received from the target-CU, it will interrupt the current data reception/transmission. Prefer no RAR based option. [LG]: Even for conditional LTM, we may survive w/o RAR based option. [Nokia, ASUSTeK]: Want to open the possibility to use RAR based TA acquisition for inter-CU LTM. [ZTE]: In RAN4, it was already defined the UE behaviour or requirement to transmit preamble w/o interruption of the serving’s data reception/transmission. With it, there would be no issue with RAR based option. [Apple]: It was only about preamble transmission, not about RAR reception. [Session chair]: Let’s see how companies are thinking.

Introduce RAR-based option (w/o consideration of conditional LTM)?

* Yes: Samsung, Vivo, Nokia, ZTE, ASUSTeK, Rakuten, ITRI, Honor
* No: Much more companies

**- UE based TA measurement and early DL sync using CSI-RS (P8: R2-2404165: CATT)**

Proposal 8: RAN2 sends LS to RAN1 to ask confirmation on the following issues for inter-CU LTM

‐ Whether to support UE based TA measurement

‐ Whether to support early DL sync using CSI-RS

* No LS to RAN1/4.

[Samsung]: No need to send LS to RAN1. It is clear RAN1 will be involved for CSI-RS. [CATT]: RAN1 is not included in the scope of inter-CU LTM. [Apple]: Company can submit contribution referring RAN2 decision w/o LS. [Lenovo]: UE based TA was introduced in Rel-18 and RAN4 is not included in the scope of inter-CU LTM. Better to send an LS to RAN4. [Xiaomi]: Support sending LS to RAN1 and RAN4. [OPPO, MediaTek]: RAN4 already defined UE requirement for UE based TA measurement. Think it is applied for both intra-CU and inter-CU. [NEC]: Is common RAN2 understanding same RAN4 requirements will be applied to inter-CU LTM? If so, it would be good to capture it here. [Apple]: Read WID carefully, it includes some related RAN4 job.

**5. Execution**

**- LTM Cell Switch Command (P5: R2-2405221: Huawei)**

Proposal 5 (modified): R18 LTM CSC MAC CE is baseline to trigger LTM cell switch for inter-CU LTM.

* Agreed.

[OPPO]: We are still waiting for SA3 response LS. We may need to put security key related information into MAC CE. [Xiaomi]: Do we need to also include CFRA resource? [Huawei]: CFRA resource aspect was discussed for inter-DU case in Rel-18, but it was concluded no special handling. Why do we need it now for inter-CU case? [Ericsson]: We can update the proposal in more general way, e.g. R18 LTM CSC MAC CE is baseline.. blabla..

**- Support of mixture of inter-CU and intra-CU LTMs (P12: R2-2405221: Huawei, P13: R2-2405062: ZTE)**

Proposal 12 (modified): Introduce a new RRC configured Rel-19 ID: if the Rel-19 ID is different for the source cell and the target cell, the UE performs PDCP re-establishment, including security key update.

Proposal 13: For the mixture of inter-CU and intra-CU LTM, if the security key update is not required, the NoResetID is reused to determine whether the RLC re-establishment and PDCP data recovery (for AM DRB) is required.

[CATT, Nokia]: Agree with proposal 12. [Xiaomi]: We should wait for SA3 response LS. [Qualcomm]: Agree with proposal 13. [Ericsson]: P13 is just to repeat how R18 intra-CU LTM works. No additional meaning for inter-CU LTM.

* Postponed.

**6. LTM Cell switch completion**

**- RACH-less LTM (P7: R2-2405221: Huawei)**

Proposal 7: Support CG-based RACH-less and DG-based RACH-less procedures for inter-CU LTM.

**- Determination of the completion (P11: R2-2404416: OPPO)**

Proposal 11: The LTM completion defined for intra-CU LTM is followed for R19 LTM.

**7. Inter-CU LTM w/o security key change (R2-2405469, P4: R2-2405316: China Telecom)**

R2-2405469 Inter-gNB LTM and moving PDCP anchor Qualcomm Incorporated, NTT DOCOMO, Sony discussion

Proposal 1: Upon inter-gNB LTM cell switch, a UE may have RRC/DRBs connect over PDCP to a gNB-CU of one LTM candidate gNB using an RLC connection to a gNB-DU of another LTM candidate gNB.

Proposal 4: Regarding the security key handling for inter-CU LTM, RAN2 to focus on the solution for the basic scenarios of inter-CU LTM with both CU-CP and CU-UP change.

R2-2404641 Important topics for further progress of the WI Apple, China Telecom (rapporteurs) discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404165 Discussion on inter-CU LTM CATT discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404271 Supporting inter-CU LTM with intra-CU LTM Intel Corporation discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404296 Further discussion on Inter-CU LTM MediaTek inc. discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404337 Inter CU LTM Discussion in Predictive mobility Scenarios Lekha Wireless Solutions discussion Rel-19 Late

R2-2404416 Discussion on inter-CU LTM OPPO discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404421 Discussion on inter-CU LTM vivo discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404464 Important aspects regarding inter-CU LTM Ericsson discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404563 Discussion on inter-CU LTM HONOR discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404608 Discussion on Inter-CU LTM Xiaomi discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404642 Discussion on Inter-CU LTM topics Apple discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404780 Discussion on inter-CU LTM Panasonic discussion

R2-2404796 Discussions security update on inter-CU LTM KDDI Corporation discussion Rel-19

R2-2404806 Discussion on Inter-CU LTM Lenovo discussion Rel-19

R2-2404826 Discussion on inter-CU LTM LG Electronics discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404835 Radio Resource aspects for intra-CU and inter-CU LTM Rakuten Mobile, Inc discussion Rel-19

R2-2404836 Initial considerations for inter-CU LTM Rakuten Mobile, Inc discussion Rel-19

R2-2404852 Discussion on subsequent inter-CU LTM ITRI discussion NR\_Mob\_Ph4-Core

R2-2404912 LTM for Inter-CU Sony discussion Rel-19 NR\_Mob\_Ph4

R2-2404921 Discussion on inter-CU LTM NEC discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404923 Discussion on Inter-CU LTM Spreadtrum Communications discussion Rel-19

R2-2404980 Discussion on Inter-CU LTM KT Corp. discussion

R2-2404984 Further discussion on Inter-CU LTM cell switch Transsion Holdings discussion Rel-19

R2-2405037 Discussion on Inter-CU LTM CMCC discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405062 Discussion on inter-CU LTM ZTE Corporation discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405111 Discussion on Inter-CU LTM Interdigital, Inc. discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405163 On inter-CU aspects for LTM Nokia discussion Rel-19 NR\_Mob\_Ph4 Withdrawn

R2-2405221 Inter-CU LTM Huawei, HiSilicon discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405316 Discussion on Inter-CU LTM China Telecom discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405362 Potential issues on inter-CU LTM Kyocera discussion Rel-19 R2-2403422

R2-2405391 Further Considerations to Support Inter-CU LTM Samsung discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405460 Discussion on security and procedures for inter-gNB LTM Qualcomm Incorporated discussion

R2-2405519 Discussion on inter-CU LTM ITL discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405553 LTM Enhancements for Inter-CU mobility CEWiT discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405588 Discussion on Inter-CU LTM ETRI discussion Rel-19

R2-2405620 Discussion on issues for supporting inter-CU LTM Sharp discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405666 On inter-CU aspects for LTM Nokia discussion Rel-19

### 8.6.3 Measurement enhancements for LTM

Details of event-triggered L1 measurement reporting including configuration aspect, beam level and/or cell level measurement?, event definitions, need of L1 filtering and timeToTrigger, Hys, etc.

**1. Use cases (P1: R2-2404677: Apple)**

Proposal 1: Event triggered L1 measurement should be designed for the following LTM purposes:

1. Select the candidate cell to trigger early synchronization.
2. Select the target cell and trigger LTM cell switch procedure.

**2. Beam or cell level measurement**

**Beam level measurement (P5: R2-2404677: Apple)**

Proposal 5: For event triggered L1 measurement, the L1 event evaluation is based beam level measurement result.

**Cell level measurement (P3: R2-2405063: ZTE)**

Proposal 3: For the input of the L1 event evaluation, RAN2 to consider both beam-level measurement result and cell-level measurement result (e.g. based on the consolidation of multiple beams of a cell).

**3. Event definition (P6-P8: R2-2404677: Apple)**

Proposal 6: Support the following Ax events based on beam specific quality of serving cell and candidate cells as the L1 LTM measurement events.

- Event A1beam: Beam of serving cell becomes better than absolute threshold;

- Event A2beam: Beam of serving cell becomes worse than absolute threshold;

- Event A3beam: Beam of candidate cell becomes amount of offset better than beam of serving cell;

- Event A4beam: Beam of candidate cell becomes better than absolute threshold;

- Event A5beam: Beam of serving cell becomes worse than absolute threshold1 AND Beam of candidate cell becomes better than another absolute threshold2.

Proposal 7: For beam specific Ax events in P6, which beam of candidate cell amongst the L1 measurement resource configuration is used for the event evaluation can be further studied.

Proposal 8: For beam specific Ax events in P6, the current beam of serving cell is used for the event evaluation, and the current beam refers to the beam which is used for the current PDSCH reception.

**4. Configuration**

**- Measurement RS (P2-P3: R2-2404677: Apple)**

Proposal 2: For event triggered L1 measurement, the L1 measurement resource configuration does not include the resource of serving cell.

Proposal 2a: UE derives the RS resource for current beam of serving cell implicitly from a QCL RS of indicated TCI state.

Proposal 3: Support the beam config of both SSB and CSI-RS in L1 measurement resource configuration in LTM config.

**- L1 Filtering (P5: R2-2404166: CATT)**

Proposal 5: RAN2 assumes filtering of the L1 measure results is needed.

**- TTT, Hysteresis, Offset (P5: R2-2405610: KDDI)**

Proposal 5: To avoid “Ping Pong” cell switch in LTM, when defining the events for triggering LTM L1 measurement report, the following aspects could be considered:

* hysteresis, beam specific offset, candidate cell specific offset;
* entering condition, leaving condition and time-to-trigger.

**5. Contents in measurement report (P10: R2-2404166: CATT)**

Proposal 10: As baseline, the following information can be included in the content of the event-triggered measure results,

‐Beam measurement results

‐Beam information (e.g., SSB index, candidate configuration id), explicitly or implicitly

‐Information of the triggered event, explicitly or implicitly

**6. MAC CE or UCI for measurement reporting?**

**MAC CE (P6: R2-2404463: Ericsson, T-Mobile)**

Proposal 6: Event-triggered L1-measurements are reported by the UE to the network via a MAC CE.

**UCI (P14: R2-2405492: LG)**

Proposal 14: RAN2 to consider transmission procedure adopted for UE-initiated/event-driven beam reporting in R19 MIMO as baseline for event-triggered L1 report for LTM. That is, Mode A (dynamically scheduling UCI by gNB) and Mode B (UCI in pre-configured resource(s) for second UL channel) are supported.

R2-2404166 Event-triggered L1 measurement reporting CATT discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404297 Discussion on event-triggered L1 measurement reporting MediaTek inc. discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404350 Measurement enhancements for LTM Fujitsu discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404417 Discussion on event-triggered L1 measurement reporting OPPO discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404422 Discussion on measurement enhancement for LTM vivo discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404457 L1 Measurement enhancements Lenovo discussion NR\_Mob\_Ph4-Core

R2-2404463 Important aspects regarding event triggered L1 measurements Ericsson, T-Mobile USA discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404564 Discussion on L1 measurement enhancements HONOR discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404677 Measurement enhancements for LTM Apple discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404779 Event-Triggered L1 Report for LTM Huawei, HiSilicon discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2404924 Discussion on measurement enhancements for LTM Spreadtrum Communications discussion Rel-19

R2-2404985 Discussion on measurement enhancement for LTM Transsion Holdings discussion Rel-19

R2-2405014 Discussion on LTM measurement related enhancements CMCC discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405063 Discussion on event-triggered L1 measurement reporting ZTE Corporation discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405077 Discussion on event triggered L1 measurement reporting NEC discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405112 Event triggered L1 reporting for LTM Interdigital, Inc. discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405149 On Measurement-related Enhancements for Rel-19 LTM Nokia discussion Rel-19 NR\_Mob\_Ph4 R2-2403305

R2-2405317 Discussion on event-triggered L1 measurement reporting for LTM China Telecom discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405385 Consideration on event-triggered L1 measurement reporting Kyocera discussion Rel-19 R2-2403423

R2-2405392 Support of Event-Triggered L1 Measurement Enhancements for LTM Samsung discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405487 Discussion on event-triggered L1 measurement reporting Xiaomi discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405492 Measurement related enhancements for LTM LG Electronics Inc. discussion NR\_Mob\_Ph4-Core

R2-2405522 Discussion on measurement enhancements for LTM ITL discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405607 Proposals for event triggered L1 measurement report Sharp discussion Rel-19 NR\_Mob\_Ph4-Core

R2-2405610 Discussion on event triggered L1 measurement reporting KDDI Corporation discussion Rel-19