3GPP TSG-RAN WG2 Meeting #113 Electronic R2-210xxxx

Elbonia, 25 January – 05 February 2021

**Agenda item: 5.4.2**

**Source: Nokia**

**Title: Summary of [AT113-e][008][NR15] LTE changes (Nokia)**

**WID/SID: NR\_newRAT-Core**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

5.4.2 LTE changes related to NR

**[AT113-e][008][NR15] LTE changes (Nokia)**

 Scope: Treat [R2-2100182](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100182.zip), [R2-2100946](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100946.zip), [R2-2101863](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip), [R2-2101864](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101864.zip), [R2-2101882](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101882.zip), [R2-2101881](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101881.zip)

 Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

 Intended outcome: Report and Agreed CRs.

 Deadline: Schedule A

[R2-2100182](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100182.zip) A remaining issue in SIB extension Samsung Electronics Co., Ltd discussion Rel-15 NR\_newRAT-Core

[R2-2100946](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100946.zip) Handling of 4-layer MIMO in EN-DC for Cat5 UEs Nokia, Nokia Shanghai Bell discussion Rel-15 NR\_newRAT-Core

[R2-2101863](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip) Reconfiguring RoHC and setting the drb-ContinueROHC simultaneously Qualcomm Incorporated CR Rel-15 36.331 15.12.0 4595 - F NR\_newRAT-Core

[R2-2101864](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101864.zip) Reconfiguring RoHC and setting the drb-ContinueROHC simultaneously Qualcomm Incorporated CR Rel-16 36.331 16.3.0 4596 - A NR\_newRAT-Core

[R2-2101882](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101882.zip) Correction on IDC indication Samsung CR Rel-15 36.331 15.12.0 4598 - F NR\_newRAT-Core

[R2-2101881](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101881.zip) Correction on IDC indication Samsung CR Rel-16 36.331 16.3.0 4597 - A NR\_newRAT-Core

# 2 **Discussion**

**Topic 1: SIB extension**

[R2-2100182](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100182.zip) A remaining issue in SIB extension Samsung Electronics Co., Ltd discussion Rel-15 NR\_newRAT-Core

As per the scenario in the paper to avoid potential IOT issue in the future, it is desirable to clarify the intended UE behavior upon receiving inconsistent SI.

|  |
| --- |
| **Proposal 1-1: Clarify the intended UE behaviour in the meeting minute that “upon receiving SI of which SIB type(s) is/are different from what was/were announced in the scheduling information in SIB1, UE decodes the SIB(s) of the SI as long as it can understand.”****Proposal 1-2: Clarify the intended UE behavior in 36.331 in the form of note that “upon receiving SI of which SIB type(s) is/are different from what was/were announced in the scheduling information in SIB1, UE decodes the SIB(s) of the SI as long as it can understand.”** |

**Question 1**: Do companies agree to the proposals made in [R2-2100182](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100182.zip)?

|  |
| --- |
| Answers to Question 1 |
| Company | Yes/No | Comments |
| Ericsson | Yes, P1-1 but… | PS: P1-1 and P1-2 are alternatives, not complementary in our understanding. There can be a transitional period where the SIB1 scheduling, that the UE is using, does not match the actual SIB scheduling, for example when ETWS/CMAS is started, and the UE just acquired SIB1 scheduling, and is trying to acquire the SIBs. In case the SIB1 scheduling does not match the content of the SI-message, the UE may still be able to decode the content of the SI-message, i.e. receive the actual SIB(s). However the UE should not be required to do so, i.e. SIB1 scheduling should match the SI-message content. In the example we provided the problem will eventually be resolved when the UE receives an SI modification indication in Paging message and receives the correct SIB1 scheduling. We propose to capture the following wording in the chairman notes:*In case the SIB1 scheduling does not match the SI-message content, the UE may be able to decode the SIB(s) in the SI-message, but the UE is not required to do so.*  |
| Qcom | No | The proposals (1 & 2) are vague and restrict the UE ability to decode SIB(s) when possible. For instance is not clear what is meant by “**understand**” in “**UE decodes the SIB(s) of the SI as long as it can understand”*** Understand = expected order by the UE

Or* Understand = best effort attempt to decode despite the fact the SI contents is not as scheduled by *schedulingInfoList* / *schedulingInfoListEx*

We believe these proposals restrict the UE ability to decode the SI when it can.Ericson’s proposal seems acceptable. |
| T-Mobile USA | Yes P1-1 but… | The current language doesn’t require the UE to decode CMAS/EWTS SIB(s) when the scheduling info doesn’t match SIB1. Decoding CMAS/EWTS is mandatory in the case were the content of the SI-message doesn’t match SIB1, it is the remaining SIB’s that must be decoded by the end of the next SI-message where the misplaced SIB’s are located. Suggest modifying the language to state: “In the case when SIB1 scheduling does not match the SI-message content, the UE must decode the content of the inserted CMAS/ETWS message. Other SIB’s contained in the mismatched SI-message must be decoded the content of the displaced SIBs by the end of the next SI-message were the SIB’s in the mismatched SI-message are repeated.”Putting a time limit of “by the next” allows the UE could decode the SIB’s in the mismatched SI-message or in the next SI-Message containing the same SIB’s that were in the mismatched SI-message.  |
| Huawei, HiSilicon | No | We agree with Qualcomm that the proposals restrict the UE behaviour. It should be left to UE implementation, i.e. UE can decode, or delete, if the SIB1 scheduling does not match the SI-message content. |
| OPPO | No | Agree with Qualcomm, UE implementation is sufficient, no need to limit the UE behaviour. |
| MediaTek | No | In our view, there should be no formal UE requirement in case that the SIB content in a SI message does not match the scheduling info provided in SIB1. If really necessary, we could capture that it is as “up to UE implementation”.The example here is just some kind of "inappropriate" broadcast information in a “transitional” period for some UE. Eventually, UE will update to the latest SIB1 configuration and there is no problem. We don’t see the need to have SPEC change. |
| Apple | No | We feel that this scenario is pretty transient, and will get rectified as soon as the UE reads the impending SI modification indication in Paging message. We have similar concerns about the interpretation of the term ”Understand”. Instead in cases of such mismatch, the SI decoding condition at the UE side can be less stringent and leave it to UE implementation. Ericsson proposal is one such way which gives this flexibility to UE. |
| Nokia | No | The paper has little motivation but has a valid point which has been discussed quite well earlier. Fortunately, the existing specs already clarify that the UE has to wait until a remainder of a modification period or a full one before it can consistently receive something.Then "as long as it can understand" has no place in a real specification or a chair notes as the meaning of this is quite open to interpretation. |
| Intel | No | This can be left to UE implementation. That UE may not be able to decode all SIBs is understood. If felt necessary, it is OK to capture Ericsson’s suggested text chair notes. We also suggest to small change to Ericsson text: …*the UE may be able to decode some of the SIB(s) in the SI-message…* |
| vivo | No |  We think there should be no requirement on UE behaviour as UE implementation can deal with this. If anything need to be considered, the revision of Ericsson text by Intel can be fine. |
| CATT | No | This can be up to UE implementation.  |
| Samsung | Yes | Our wording seems a bit misleading since all companies are talking about the implementation restriction on decoding. What we actually tries to clarify is that even when such phenomena occur, UE shall not bar the cell (our NW has observed similar behaviour in the past). Anyway, the issue itself seems well shared by the industry (i.e. scheduling and SI contents can be different) and the alternative wording suggested by Ericsson or Intel is fine for us.   |
| ZTE | - | We are fine to clarify this, and the proposal suggested by Ericsson seems good to us. |
| Sequans | No | We agree with QC view and Ericsson proposal. |

**Summary 1**: Quite a majority of the companies do understand that in the transitional period the UE implementation is sufficient and there is no need to specify additional aspects and formalize a UE behavior. However, some companies think that a clarification on the lines proposed by Ericsson may be captured in the chair notes.

**Proposal 1a**: The CR R2-2100182 is not pursued.

**Proposal 1b:** Capture the following in chair notes: *“In case the SIB1 scheduling does not match the SI-message content, the UE may be able to decode some of the SIB(s) in the SI-message, but is not required to do so”.*

**Topic 2: Cat5 MIMO issue**

[R2-2100946](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100946.zip) Handling of 4-layer MIMO in EN-DC for Cat5 UEs Nokia, Nokia Shanghai Bell discussion Rel-15 NR\_newRAT-Core

|  |
| --- |
| **Observation 1:** Cat5 UEs always support 4-layer MIMO in LTE-only mode, and always utilize 2-bit RI bit width.**Observation 2:** Cat5 UEs need not support *maxLayersMIMO* signalling.**Observation 3:** LTE Cat5 UE supporting EN-DC need not support 4-layer MIMO in EN-DC even though the UE does support 4-layer MIMO in LTE-only mode.**Observation 4:** Cat5 UE RI bit width for TM3/4 is only determined according to the RRC signalling, PBCH antenna ports and UE category.**Observation 5:** Any UE supporting EN-DC shall also support the configuration of *maxLayersMIMO* regardless of whether it supports 4-layer MIMO in EN-DC.**Observation 6:** RAN2 discussion is needed on whether the signalling the value *twoLayers* via *maxLayersMIMO* for the case when UE only supports 2-layer MIMO is allowed or needed.**Observation 7:** It is not clear what RI bit width Cat5 UE uses during EN-DC operation.**Proposal 1:** RAN2 to clarify what is the correct interpretation on LTE RI bit width for Cat5 UEs in EN-DC: 1) The UE always used 2-bit RI bit width (even if it only supports 2-layer MIMO in EN-DC mode) or 2) The used RI bit width depend on the maximum support MIMO layers, i.e. if UE only supports 2 layers in EN-DC, it will use 1-bit RI bit width in EN-DC.**Proposal 2:** Mandate Cat5 UEs to indicate *fourLayerTM3-TM4-r15* in all of the EN-DC FeatureSets.**Proposal 3:** Allow signalling the value *twoLayers* for *maxLayersMIMO* for EN-DC case with TM3/4.**Proposal 4:** Adopt the RI bit width solution for handling TM3/4 for Cat5 UEs also for the case of TM9/10 for Cat8 UEs . |

As proponent, we would first like companies to have a common understanding of the issue. The CR clarification part may come later but first the principles warrant a discussion.

**Question 2**: Do companies agree to the Observations and the issue based on Proposal 1 in [R2-2100946](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2100946.zip)? If yes, then please continue with rest of the proposals and comment how we might end up clarifying this.

|  |
| --- |
| Answers to Question 2 |
| Company | Yes/No | Comments (e.g. changes required to be acceptable, why a CR is or is not needed) |
| Qcom | Check comments | Agree with the observations and the Proposal-1 to reach a common understanding on how to interpret the LTE RI bit width for CAT5 UE when UE is in EN-DC.However we’re **objecting Proposal-2** that mandates on the CAT5 UE **to support 4 layers on all LTE CCs** while in EN-DC (although it supports 4 layers while in LTE), as this might not be possible once UE switch from LTE to EN-DC. Further discussion is needed to reach a solution that satisfies all parties.  |
| T-Mobile USA | Yes | We agree there is a mismatch, need to check on a solution.  |
| Huawei, HiSilicon | - | For proposal1, we think Option 2) is more reasonable.We also object Proposal 2. It can be relied on UE implementation to carry *fourLayerTM3-TM4-r15*.We are open on Proposal 3/4 and further discussion is needed. |
| MediaTek | - | We may need more time to check the issue but would like to understand is it TRUE that we will have CAT5 UE that support EN-DC in the field. Is the discussion triggered by real IODT issue? We are fine to discuss P1 but also object to P2. UE support 4-layer MIMO in LTE-only mode may not support 4-layer MIMO in EN-DC due to some resource limitation. |
| Apple | Check comments | We agree with the observation, but don’t agree to the proposal to mandate the capability. We agree with Qualcomm observation in this case. |
| Nokia | Yes | [Proponent] Answer to Mediatek, yes this issue has been pointed out by our implementation (that’s why it is Rel-15 and impacts EN-DC). |
| ZTE | Yes | We agree some clarification is needed, and RAN1should be involved as well. |
| Ericsson | - | We also agree further discussions are is needed to sort out this. We assume UE should signal the MIMO capability in featureSet in LTE capability if the UE supports different capability than implied by the UE category.  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 2**: Most of the discussion concerned P2, whereas the main question of P1 received few comments, and almost nobody commented P3/4.

Based on companies’ feedback it's clear that P2 cannot be agreed: Even for Cat5, the MIMO capabilities of the UE in EN-DC may be restricted compared to LTE standalone. Companies also agree that there is no new UE capability expected to be introduced for this issue. Given the fact that there was no real feedback on P3 and P4, it is recommended to continue discussion on P1 as this is the contentious point for the IODT issue.

**Proposal 2**: Continue discussion on P1: i.e. RAN2 to clarify what is the correct interpretation on LTE RI bit width for Cat5 UEs in EN-DC out of the following options:

* Option 1) The UE always used 2-bit RI bit width (even if it only supports 2-layer MIMO in EN-DC mode)
* Option 2) The used RI bit width depend on the maximum support MIMO layers, i.e. if UE only supports 2 layers in EN-DC, it will use 1-bit RI bit width in EN-DC mode (and it uses 2-bit RI in LTE-only mode).

**Topic 3: RoHC and setting the drb-ContinueROHC**

[R2-2101863](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip) Reconfiguring RoHC and setting the drb-ContinueROHC simultaneously Qualcomm Incorporated CR Rel-15 36.331 15.12.0 4595 - F NR\_newRAT-Core

[R2-2101864](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101864.zip) Reconfiguring RoHC and setting the drb-ContinueROHC simultaneously Qualcomm Incorporated CR Rel-16 36.331 16.3.0 4596 - A NR\_newRAT-Core

|  |
| --- |
| Current specification allows network to reconfigure the RoHC and set the drb-ContinueROHC to “*true*”, simultaneously in the same RRC Reconfiguration message. This would allow change in configuration parameters like maxCID and profiles. It is not clear how to handle the change of ROHC configuration parameters while continuing ROHC context.   The above of configuration defies the purpose of setting the drb-ContinueROHC where RoHC contexts won’t be sustained across mobility from source to target cell.Therefore, we propose to add clarification to the spec that if network decides to reconfigure the RoHC, no need to set the drb-ContinueROHC to “*true*”.**Similar CR was approved in NR spec (R2-2008038), the intention of this CR is to align both specs so that RoHC behavior is uniform across the RATs.** |

**Question 3**: Do companies agree to the intent in the CRs in [R2-2101863](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip) and [R2-2101864](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip)?

|  |
| --- |
| Answers to Question 3 |
| Company | Yes/No | Comments (e.g. changes required to be acceptable, why a CR is or is not needed) |
| Ericsson | No | We agree that there are certain RoHC configuration parameters which cannot be updated during a handover if the drb-ContinueRoHC flag is set. However, drb-ContinueRoHC was introduced in Rel-11 and if this is a problem then it must have existed since this release. If we want to correct the spec we need to go all the way back to Rel-11 which is a bit too much. |
| Qcom | Yes | **Proponent**Similar change was adopted in NR, the intention is to unify RoHC across RATs (LTE and NR). **Response to Ericsson comment**: agree, this go back to Rel.11 when drb-continueRoHC was introduced, however, **even if this CR is implemented from Rel-11 will not cause interoperability issue**, rather prevent suboptimal performance at UE, so it’s not too much to do.  |
| Huawei, HiSilicon | No | The CR does not look essential. The issue can be avoided by smart network implementation. |
| MediaTek | Yes | The proposal looks reasonable to us. |
| Apple | Yes | We understand the concern from R11, but if the intent is to unify it between LTE and NR we are fine. |
| Nokia | Yes |  |
| Intel | ? | We agree with the intention that RoHC continue cannot be used when the configuration changes. The text proposal is a bit difficult to follow. If it is felt essential, suggest to rephrase by adding a separate statement that reconfiguration of RoHC should not be done together with RoHC continue. |
| vivo |  | Agree with Huawei, we do not think the CRs are not essential. |
| CATT | Yes |  Align with NR, so it is ok to us |
| Samsung | Yes, but | We believe the network implementation is not doing the concerned thing since LTE has been stable for a long time. Regardless of having this CR, the intended behaviour would be the same. If the majority are reluctant to have this CR by applying a high bar to earlier releases, we also think it makes sense. |
| ZTE | Yes | We agree the intention and change proposed in the CR seems fine for us. |
| Sequans | Yes |  |
|  |  |  |

**Summary 3**: A majority of companies agree that there is technical merit in pursuing the clarification and aligning the behavior to NR.

**Proposal 3**: Agree to the CRs in [R2-2101863](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip) and [R2-2101864](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101863.zip).

**Topic 4: IDC indication**

[R2-2101882](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101882.zip) Correction on IDC indication Samsung CR Rel-15 36.331 15.12.0 4598 - F NR\_newRAT-Core

[R2-2101881](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101881.zip) Correction on IDC indication Samsung CR Rel-16 36.331 16.3.0 4597 - A NR\_newRAT-Core

Companies are requested to check the CR cover page for the description but a short snapshot of why the

CR is required is listed below:

|  |
| --- |
| The reasons to have a CR is described as follows:1. When victimSystemType or interferenceDirectionMRDC in AffectedCarrierFreqCombInfoMRDC changes from last transmitted InDeviceCoexIndication message, UE will not initiate a new transmission of InDeviceCoexIndication message.2. Misalignment between text of UE procedure and ASN.1 format |

**Question 4**: Do companies agree to the CRs in [R2-2101881](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101881.zip) and [R2-2101882](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2101881.zip)?

|  |
| --- |
| Answers to Question 4 |
| Company | Yes/No | Comments |
| Ericsson | Yes |  |
| Qcom | Yes |  |
| Huawei, HiSilicon | Yes |  |
| OPPO | Yes |  |
| MediaTek | Yes |  |
| Apple | Yes |  |
| Nokia | Yes |  |
| Intel | Yes |  |
| vivo | Yes |  |
| CATT | Yes |  |
| Samsung | Yes (Proponent) |  |
| ZTE | Yes |  |
| Sequans | Yes |  |

**Summary 4**: Unanimous support to pursue the clarifications in R2-2101881 and R2-2101882.

**Proposal 4**: Agree the CRs in R2-2101881 and R2-2101882.

# 4 Conclusion

Always echo the list of observations and proposals.

# Annex A – Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Nokia | Amaanat | amaanat.ali@nokia.com |
| Ericsson | Oscar | oscar.ohlsson@ericsson.com |
| Qualcomm | Mouaffac | mambriss@qti.qualcomm.com |
| T-Mobile USA | John Humbert | John.Humbert2@T-Mobile.com |
| Huawei, HiSilicon | Lili Zheng | zhenglili4@huawei.com |
| OPPO | Jiangsheng Fan | fanjiangsheng@oppo.com |
| MediaTek | Felix Tsai | chun-fan.tsai@mediatek.com |
|  Apple | Sethuraman Gurumoorthy | sethu@apple.com |
| Intel | Sudeep Palat | Sudeep.k.palat@intel.com |
| vivo | Boubacar | kimba@vivo.com |
| CATT | Jing Liang | liangjing@catt.cn |
| Samsung | Sangyeob Jung | sy0123.jung@samsung.com |
| ZTE | Yu Liu | liu.yu3@zte.com.cn |
| Sequans | Olivier Marco | omarco at sequans.com |