3GPP TSG-RAN WG3 #119bis-e R3-23xxxx

17th – 26th April 2023

Item: 14.2

Source: CATT (Moderator)

Title: CB: # MobilityEnh1\_RAN1 LS: SoD Reply LS to RAN1 LS in R3-231107

Document for: Discussion

# Introduction

This paper captures the following CB discussion:

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| **CB: # MobilityEnh1\_RAN1LS**  **- Check the feasibility and potential impact on specs of RAN 3 of two options, i.e. with RAR and without RAR,**  **- Working on drafting LS to RAN1, if needed.**  (moderator - CATT)  Summary of offline disc [R3-231883](Inbox\R3-231883.zip) |

Actions requested by RAN1 in LS R3-231107:

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| **ACTION:** RAN 1 respectfully asks RAN2 and RAN3 to check the feasibility and potential impact on specs of RAN2 and RAN 3 of all options, i.e. with RAR (from serving or candidate cell) and without RAR, in the agreement described in section B. Also, RAN1 respectfully asks RAN2 and RAN3 to take the RAN1 agreements into consideration for their work. |

In first round of this CB, we will discuss the feasibility and the potential impact on specs of RAN3, including the **a) RACH resource for TA acquisition alignment between source DU and candidate DU** and b) **impacts on” with RAR” and “without RAR” solutions**.

And in second round, we will check the draft reply LS based on the agreements.

Deadline of the CB **wendnesday, April 19, 08:00 UTC.**

# For the Chairman’s Notes

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# Discussion

For intra-DU LTM, as all companies clarified in their papers, no RAN3 impact is foreseen for either RA “with RAR” or “without RAR” and everything can be done inside the gNB-DU by gNB-DU implementation. **So we only need pay attention to inter-DU case in below discussion.**

## RACH resource for TA acquisition alignment

From the papers [1-7], they all mentioned RACH resource for TA acquisition alignment between source DU and candidate DU is needed for both “withRAR” and “withoutRAR” solutions. In the [1][3][4][5][6], they also specify the node decides to trigger TA acquisition is CU. Moderator thinks it is easy to get the agreement in RAN3 and want to check companies’ views.

**Proposal:** **The CU requests the candidate DU to provide** **RACH resource for TA acquisition in inter-DU case.**

**Q1: Companies are invited to express their view on the above proposal?**

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| **Company** | **Yes/No** | **Comment** |
| E/// | Yes with comments | CU is the one who requests the candidate DU for TA acquisition. The “RACH resource” could include the related configurations, e.g., Random Access Preamble indices and RACH occasions with the associated SSB indices for each LTM candidate cell configured for TA establishment. Though the contents are not defined by RAN3. |
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If the answer of Q1 is yes, the next issues is when will the CU request RACH resource for TA acquisition and which procedure is used for it. There are mainly two options according to [1][3][5]:

* **Option 1:** when an LTM candidate is being configured, and use the UE Context Setup procedure
* **Option 2:** at a later moment, after an LTM candidate cell for which a TA value is unknown, and UE Context Modification procedure.

**Q2: Companies are invited to express their view on the above two options?**

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| **Company** | **Option 1/**  **option 2** | **Comment** |
| E/// | Both | As described in our paper, there are two cases related to TA acquisition, which are i) when an LTM candidate is being configured or ii) at a later moment, after an LTM candidate cell for which a TA value is unknown. Thus both UE Context Setup and UE Context Modification procedures should be taken into account. |
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## “With RAR” and “without RAR” solutions

After configured the RACH resource for TA acquisition, the source DU can decide to trigger early TA acquisition by PDCCH-ordered RACH as per RAN1 agreement[1], and then candidate DU transmit the RAR/TA back to serving DU follow the “with RAR” or “without RAR” solutions.

In case of “with RAR and the RAR is received from candidate cell”, the candidate DUs does not need to transmit RAR to the serving DU. Therefore, RAN3 only needs to consider potential RAN3 spec impact for the two cases, (a) with RAR and the RAR is received from serving cell, and (b) without RAR.

**Observation: RAN3 only need to consider potential RAN3 spec impact for the following two cases**

**(a) with RAR and the RAR is received from serving cell, and**

**(b) without RAR**

**Q3: Companies are invited to express their view on whether agree with observation as above?**

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| **Company** | **Yes/No** | **Comment** |
| E/// | Yes and No | In case b, without RAR, candidate DU generates TA value for the UE, and then sends to the serving DU. So the serving DU has it ready upon the cell switch assuming approach 1 is adopted for the execution.  Case a is actually very similar to be, for the case “RAR” or RAR-like message is from serving cell. The reason is that the UE needs to know as soon as possible that the preamble was successfully transmitted, i.e., the C-DU needs to indicate the TA value as soon as it calculates to the CU/S-DU.  RAN3 considers seeking for the same procedure to cover both cases.  One additional case with potential RAN3 impacts would be in which RAR is from candidate cell, the S-DU may need to know when the procedure is successfully completed or failed between the UE and the C-DU, so the S-DU may stop/start scheduling restrictions while the UE is transmitting to the C-DU.  Thus, RAN3 impacts should not be limited to case a and b only. |
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For “with RAR” and the RAR is received from serving cell case, i.e., case (a), RAN3 needs to specify how the RAR is transmitted from the candidate DU to the serving DU, e.g., the candidate DUs shall transmit the RARs to the serving DU by F1 interface through the CU [9][10], candidate DU transmits RAR to CU, and then CU transmits it to serving DU.

**Q4: Companies are invited to express their view on whether agree the above impact on case (a), and whether there exists any other impacts?**

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| **Company** | **Yes/No** | **Comment** |
| E/// | Yes |  |
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For “without RAR” case, i.e., case (b), two options are foreseen on how and when the TA value(s) is(are) transmitted from the candidate/target DU to the serving DU and how the TA value is maintained[9][10]:

**- Option 1:** The candidate DUs transmit the TA values of candidate cells to serving DU before LTM triggering and the serving DU maintains the TA values, e.g., the candidate DUs shall transmit the TA values to the serving DU by F1 interface through the CU.

**- Option 2:** After LTM is triggered, the serving DU requests the target DU to transmit the latest TA value which is maintained by itself before sending LTM command, e.g., the target DU shall transmit the requested TA value to the serving DU by F1 interface through the CU.

From the perspective of RAN3, the Option 1 and option 2 are both feasible in “ without RAR”case, a relative LS about feasibility checking for two options has already sent to RAN2, as reply LS is not received, so we can just put the two options in the reply LS.

**Q5: Companies are invited to express their view on whether agree the above impact on case (b), and whether there exists any other impacts?**

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| **Company** | **Yes/No** | **Comment** |
| E/// | Yes with comments | Both options are feasible, and the selection would be depending on the approaches for execution. Furthermore, Approach 2 indeed opens up for the possibility of Option 2, but it is also possible to assume option 1 for approach 2. |
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According to the analysis from companies, we can see from RAN3 perspective, both options is feasible. What’s more, “with RAR” and “without RAR” solution have the same impact on RACH resource for TA acquisition alignment between source DU and candidate DU. The different impact is on when/how to transmit the TA/RAR from the candidate/target DU to the serving DU., As the first part have a common impact, there seems no need to inform it to other groups. We suggest to just include the different impacts between “with RAR” and “without RAR” solution in the reply LS.

**Proposal: No need to include the RACH resource for TA acquisition alignment in the reply LS, only tell other group both options are feasible and give the different potential impacts for “with RAR” and “without RAR” solutions.**

**Q6: Companies are invited to express their view on the above proposal about above proposal?**

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| **Company** | **Yes/No** | **Comment** |
| E/// | Yes with comments | As indicated in the reply for Q3, other potential RAN3 impacts are foreseen, which should be included in the reply as well. |
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## Others

**Q7: Other issues, if any.**

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| **Company** | **Comment** |
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# Conclusion, Recommendations [if needed]

# References

[1] R3-231183, Discussion on TA Acquisition for LTM (Nokia, Nokia Shanghai Bell)

[2] [R3-231315](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231315.zip), Signalling Support for LTM (Qualcomm Incorporated)

[3] [R3-231447](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231447.zip), Discussion on L1L2 based inter-cell mobility (Lenovo)

[4] (TP for LTM BL CR to TS 38.401) Solutions for LTM (Ericsson)

[5] (TP for L1L2Mob BLCR for TS 38.401): L1/L2 Mobility procedure on F1 (Huawei)

[6] (TP to Mob\_enh2 BL CR TS38.401) Discussion on L1/L2 based Inter-cell Mobility (Samsung Electronics France SA)

[7] [R3-231813](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231813.zip), Further discussion on LTM (NTT DOCOMO INC.)

[8] R3-231107 LS on L1 measurement RS configuration and PDCCH ordered RACH for LTM (RAN1, Fujitsu, CATT)

[9] R3-231327 Discussion on replying to the RAN1 LS on L1 measurement RS configuration and PDCCH ordered RACH for LTM (Fujitsu, CATT)

[10] [R3-231326](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231326.zip) [Draft] Reply LS on L1 measurement RS configuration and PDCCH ordered RACH for LTM (Fujitsu, CATT)