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

Hefei, China, 14th – 18th of October 2024

**Agenda item: 7.4.1**

**Source: Nokia**

**Title: Report from [AT127b][104][MOB] (Nokia)**

**WID/SID: NR\_Mob\_enh2-Core - Release 18**

**Document for: Discussion and Decision**

# 1 Introduction

This is to discuss the following aspects:

* [AT127b][104][MOB] (Nokia)

**Scope:** To discuss need of corrections on P3 in R2-2408945, R2-2408452, R2-2408632, and capture agreeable corrections in 38.300 miscellaneous CR.

**Intended outcome:** 38.300 CR in R2-2409355 to be in principle agreed. Discussion summary in R2-2409356 if needed. Email approval.

**Deadline:** Thursday 10:00am.

The details are given in the following sections.

# 2 Discussion

## 2.1 Stage 2 changes in R2-2408945

In section 2.2 of [1] it is discussed how TS 38.300 is compliant with the RAN4 requirements when it comes to L1-RSRP reporting to the NW prior to Early TA acquisition or TCI state activation for LTM. As noticed in [1], Figure 9.2.3.5.2-1 and the corresponding description in TS 38.300 are not aligned with RAN4 requirements which state the following:

* TCI state activation can be done only for a known TCI state (i.e. UE has recently reported L1-RSRP for the RS associated to the TCI state) or, in case of FR1, for an unknown TCI state if the UE has reported L3 measurement result with the associated SSB index of the TCI state
* PDCCH-ordered RACH requirements in TS 38.133 apply only for the UE that has provided L1- or L3-RSRP report (for FR1) or L1-RSRP report (for FR2).

These two optional LTM components (i.e. TCI state activation and PDCCH-ordered RACH) are reflected in Figure 9.2.3.5.2-1 of 38.300, steps 4a and 4b, respectively. However, there is no L1 or L3 measurement reporting prior to steps 4a and 4b shown in Figure 9.2.3.5.2-1. Thus, the authors of [1] suggest a correction to TS 38.300. The correction can be either a modification to the corresponding procedure or an update to Figure 9.2.3.5.2-1.

Companies are invited to share their view and express how the issue described in [1] can be resolved.

**Question 1: How to resolve the issue described in section 2.2 of R2-2408945 (i.e. the lack of L1 or L3 measurement reporting in Figure 9.2.3.5.2-1 before steps 4a and 4b). Please select one of the options:**

1. **Update the procedure (e.g. as shown in R2-2408945)**
2. **Update the Figure 9.2.3.5.2-1 and insert the optional reporting prior to steps 4a and 4b**
3. **Other update – please describe**
4. **No update is needed**

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| **Company** | **Option** | **Comments** |
| Huawei, HiSilicon | a) | It is ok to refine the text for the reasons mentioned but it is also not mentioned that L1 measurements for LTM are configured in step 2, that they are optional, that they can only be configured for cells for which L3 measurements are also configured, and that the trigger for cell switch could be a L3 report. So we should we add all of that to be consistent?  Besides, it looks a bit strange to add the two proposed stage 3 references while there is no reference for anything else (except in one place for no clear reason). |
| MediaTek | C or D | D: No update is needed, as the procedure and capability are captured clearly in UE capability specs.  Or  C: Add a note at the end of section 9.2.3.5.2 to clarify that the UE can rely on L3 measurements for LTM candidate cells instead of L1 measurements and transmit an L3 measurement report to the gNB based on its capability. No other correction is required in the stage-2 spec.  Reason: In previous discussion, the decoupling of L1 MR and LTM was based on the UE's capability by the consideration of implementation complexity. This should not be the original design principle of LTM. Since the UE capability specs capture these features clearly, it is unnecessary to emphasize all the details in the stage-2 specifications.  If companies have concerns, a note can be added at the bottom of the sections. It is unnecessary to change every detail as it would have impacts on other parts of the sections in LTM (not only the parts mentioned in this CR). |
| Ericsson | a) | Clarify is good but maybe we can implement the changes from R2-2408452 |
| Lenovo | d | According to coversheet of [2] (R2-2408452), ‘*RAN2 has in RAN2#127 meeting agreed that the L1 measurement capability is not a prerequisite to support the LTM feature and thus the LTM cell switch procedure could be possible to be triggered also upon the reception of a L3 measurement report.’*  If the above is correct, L1 measurement report is optional. It seems unnecessary to update. |
| ZTE | c or d | Tend to agree with MediaTek. It seems no much need to capture all details in the stage-2 spec considering that such requirements have been clearly specified in the UE capability spec.  If needed, a note can be added to clarify that TCI state activation and PDCCH-order RACH shall only be triggered for candidate cells for which the UE has reported L1 or L3 measurement report. |
| vivo | a or d | We think it is just a clarification, thus we could accept it.  On the other hand, we think it could be up to network implementation to ensure that when gNB triggers the PDCCH order for early TA acquistition or sends the TCI state activation MAC CE, UE has reported L3 measurement to it, thus there is no need to clarify it in UE procedure, which means d) could be accepted. |
| LGE | d) or  c) with comments | MediaTek’s comments make sense. It is not necessary to capture all the stage-3 details in stage-2 spec.  If the change is really needed, just refering TS 38.133 is fine. Please see the comments below.  - The intention of the first change in 4a in TP (Annex A) is correct. But, it seems okay to just refer to TS 38.133 not a specific section number as follows:  **The UE may activate and deactivate TCI states of LTM candidate cell(s), as triggered by the gNB and defined in [13]~~, section 8.25~~.**  - The second change in 4b in TP seems wrong. TS 38.133 [13] says that “*the requirements in this clause apply if PDCCH order-based RACH on candidate cell is triggered based on L1-RSRP report or L3-RSRP beam-level report in FR1, or based on L1-RSRP report in FR2*”. This is not about the time to perform PDCCH order RACH to LTM candidate cell, but about the prerequisite of PDCCH order RACH.  By the way, we don’t think the RRM requirement is decribed in stage-2 spec (i.e., MediaTek’s opinion). Just refering is fine as follows:  **~~Upon L1-RSRP or L3-RSRP measurement report (as described in [13], section 6.2.2C, t~~The UE performs early TA acquisition with the candidate cell(s) as requested by the network before receiving the cell switch command as specified in clause 9.2.6 and [13].** |
| Nokia | a or b | It is true step 1 in this figure already comprises the Measurement Reporting, but this is not a report upon LTM is configured. Our point is that – no matter if this is L1 or L3 measurement reporting – that steps 4a and 4b cannot happen (as per RAN4 requirements) if there is no beam-level L1-RSRP provided to the gNB.  We acknowledge the comments from Huawei – fine not to have any reference to Stage-3 RAN4 specification in the procedural text captured in 38.300. But we simply believe the current figure with steps 4a and 4b is incomplete without the changes suggested in R2-2408945. So it is about the order (a copy of step 5 should also optionally happen prior to Step 4a and 4b). |
| Samsung | a | We also think this is just clarification and good to have it. |
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**Summary for Q1:**

## 2.2 Stage 2 changes in R2-2408452

The authors of [2] propose modifications to two sections of TS 38.300. First of all it is suggested to modify 9.2.3.5.1 by introducing a sentence that explains all activated TCI states corresponding to LTM candidate cells are deactivated upon L3 handover execution. \

Companies are invited to express their view on whether such change is correct and needed in this section of TS 38.300.

**Question 2: Do you support to update 9.2.3.5.1 by introducing a sentence that explains all activated TCI states corresponding to LTM candidate cells are deactivated upon L3 handover execution (as suggested in R2-2408452). Please provide your answer in the table below with potential comments:**

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| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | The deactivation of legacy TCI states upon handover is not captured, so the proposal might create confusion that this is not true for legacy TCI states. In general, this kind of detail is not needed in stage 2. |
| MediaTek | Yes | This is aligned with MAC spec 38.321 clause 5.18.36:  **The configured candidate cell TCI states are initially deactivated upon (re-)configuration by upper layer and after reconfiguration with sync that is not triggered by LTM.** |
| Ericsson | Yes | As MediaTek pointed out, this is the behaviour we already have in MAC and it would be good to align. |
| Lenovo | Yes, but | We need to clarify which case was agreed by RAN1.   * Case#1: all activated TCI states for only LTM MCG candidate cell should be deactivated after L3 PCell handover. * Case#2: all activated TCI states for LTM MCG/SCG candidate cell should be deactivated after L3 PCell handover. * Case#3: all activated TCI states for only LTM SCG candidate cell should be deactivated after L3 PSCell handover. * Case#4: all activated TCI states for LTM MCG/SCG candidate cell should be deactivated after L3 PSCell handover.   There is a following sentence in TS38.300. we can update the following sentence to capture the L3 handover case.  *9.2.3.5.1 General*  *All the activated TCI states except those received in the cell switch command are deactivated upon LTM cell switch execution or L3 handover.* |
| ZTE | Yes | It’s fine to align with the MAC spec. And it seems more suitable to capture this in the place suggested by Lenovo. |
| vivo | No | MAC spec has capture the related conclusion and it is clear, we don’t think it is necessary in stage-2. |
| LGE | Yes | Fine to align with MAC spec. We also think the Lenovo’s suggested text seems good. |
| Nokia | No | We agree with vivo and Huawei. These kind of details might be skipped in Stage-2 specification. |
| Samsung | No | Same view with Vivo, this text is not needed in stage 2. |
| Vodafone | Yes | In my view, if it is a common understanding that the proposed corrections do not contradict MAC specification, there is also no issue to capture it in Stage 2 |
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**Summary for Q2:**

Also in [2] it is suggested to update section 9.2.3.5.2 of TS 38.300 by introducing changes to Figure 9.2.3.5.2-1 and state the UE can report either L1 or L3 measurement report (step 5 in Figure 9.2.3.5.2-1) Step 5 is also updated in the procedural text below the figure. In addition [2] suggests to extend the sentence explaining that for subsequent LTM there is no need to reconfigure or add other LTM candidate configurations.

Please kindly comment which of the changes suggested in R2-2408452 for section 9.2.3.5.2 are acceptable:

**Question 3: Which of the changes suggested in R2-2408452 for section 9.2.3.5.2 are acceptable:**

1. **Update to Figure 9.2.3.5.2-1**
2. **Update to the procedural text for step 5 under Figure 9.2.3.5.2-1**
3. **Modification to the sentence on subsequent LTM**
4. **None of the above**

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| **Company** | **Option(s)** | **Comments** |
| Huawei, HiSilicon |  | All the changes proposed are ok |
| MediaTek | See comment in Q1 | We can either simply add a note to clarify this at the end or leave the stage-2 specification unchanged. Merely changing the part mentioned in this CR is insufficient. (It requires a lot of change) |
| Ericsson (Proponent) | Yes | For us it would be good to clarify such aspects in stage2. Probably a further clarification that maybe needs to be done is that the configuration of L1 or L3 measurements is not either/or but network should have the possibility to configure both L1 and L3 measurements, also because this is according to the RAN4 requirements in 38.133. |
| Lenovo | See comments. | * It seems unnecessary to update the measurement in figure since measurement report is included in step 1. * Fine with the change for subsequent LTM. |
| ZTE | Yes, but | The proposed changes are fine to us.  Besides, some changes in other places may also be required to clarify that LTM can be triggered based on L1 or L3 measurements. For example, the following sentence:  LTM is a procedure in which a gNB receives L1 measurement report(s) from a UE, and on their basis the gNB may change UE serving cell by a cell switch command signalled via a MAC CE. |
| vivo | See comments | We think UE anyway will perform L3 measurement on the candidate cell if UE is configured with *MeasConfig*, it is not related to whether the LTM is configured or not. Thus we wonder whether it is suitable to add the L3 measurement in LTM procedure.  However, since we have agreed that the LTM could based on L3 measurement, we think maybe we could add a note like that “The gNB could decide to execute cell switch via LTM based on LTM related L1 measurement report or L3 measurement”. |
| BT | A, C | For proposal b)  We agree with the intention of b) which we consider is that LTM triggering is based on L1 or L3 measurements but not both simultaneously. The problem we observe is that “instead” does not allow the UE to perform L1 and L3 measurements on LTM cells “*Instead of L1 measurements, the UE can perform L3 measurements on cell(s) which are configured as LTM candidate cell*”. Independently of LTM, UE needs to perform neighbour L3 measurements for other purposes than LTM triggering.  Proposed sentence:  Besides of L1 measurements, the UE can perform L3 measurements on cell(s) which are configured as LTM candidate cell(s). The LTM triggering decision is based on L1 measurements when configured, or based on L3 measurements when L1 measurements are not configured by the network. |
| LGE | a) and b) | All changes suggested in Section 9.2.3.5.2 are fine.  Further comment: ZTE’s comment is correct. The yellow-highlighted part (in 9.2.3.5.1 General) needs to be updated accordingly. In addition, the definition of LTM decribed in [3.2 Definitions] needs to be updated accordingly as follows, e.g.:  **L1/L2 Triggered Mobility**: a cell switch procedure that the network triggers via MAC CE based on L1 measurement reports or L3 measurement reports. |
| Nokia | a and modified b | We see no need to capture c). a is fine as it is. For b) we suggest to modify the text: it currently says L1 or L3 measurements, while it shall actually indicate it is L1 or L3 measurement **report**. The UE is not allowed to perform L3 measurements alone for this LTM purpose, but to report L1-RSRP via L3 measurement report. |
| Samsung | Yes | Proposed changes are fine to us. |
| Vodafone (Proponent) | Yes | Obviously, we are fine with the text as of today, but we think that adding notes is not a good way and the picture should be aligned with the text. On L3 in parallel to L1 (see Vivo and Ericsson), I am open to consider other text. Probably we can say something like for the propose of early synchronization and/or Cell Switch (MAC CE), the Network **should use** either L1 or L3 measurement results. |

**Summary for Q3:**

## 2.3 Stage 2 changes in R2-2408632

The authors of [3] discuss the coexistence of Conditional Handover (CHO) and LTM for SCG. It is claimed in [3] that the evaluation of execution conditions for CHO should be suspended when LTM for SCG is triggered.

Companies are asked to clarify if that is the expected UE behaviour when both CHO and SCG LTM are configured.

**Question 4: Do you agree with the change suggested in R2-2408632 that the UE is not required to evaluate the execution conditions of CHO when SCG LTM cell switch is triggered? Please provide the answer below with a potential explanation:**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | We tend to disagree with the behaviour. In any case, this is something not testable, so there is no use to specify anything. |
| MediaTek | Yes | This seems a valid guidance to UE implementation. |
| Ericsson | No | We prefer to not specify anything and leave this to UE implementation. |
| Lenovo | Yes | There are two coexistence cases between SCG LTM and conditional configuration as follows. RAN2 only address the coexistence case#1.   * Coexistence case#1 between SCG LTM and subsequent CPAC; * Coexistence case#2 between SCG LTM and CHO.   According to the current specification for case#1, after SCG LTM is triggered, the UE will keep subsequent CPAC and stop evaluating the execution conditions of subsequent CPAC. UE restarts evaluating the execution conditions of subsequent CPAC after SCG LTM is completed. UE can have the similar behaviour for the case#2. |
| ZTE | No | According to the current spec, the UE is not required to stop CHO evaluation upon legacy PSCell change. The same principle can be followed by SCG LTM. There is no need to specify the UE behaviour and it can be up to UE implementation. |
| vivo | Yes with comments | We think the common understanding is that UE will evaluate the execution conditions of CHO when SCG LTM cell switch is triggered, however, there is no such restriction for CHO with legacy PSCell change, thus we prefer to capture that “UE stops evaluating the execution conditions of CHO once a PSCell change is triggered” not only the LTM PSCell change scenario.  Besides, in TS37.340, it has capture that “stops evaluating the execution conditions once a PCell change or a PSCell change is triggered”, thus we think similar restriction could also be captured in TS38.300. |
| LGE | No | No need to specify anything. We don’t see any problem due to continuation of CHO evaluation during R18 SCG LTM cell switch, because R18 SCG LTM is intra-SN mobility without MN involvement. |
| Nokia | No | CHO and SCG LTM are two separate things (unless CHO also has an SCG part). So we see no reason why the UE shall suspend CHO evaluation during SCG LTM. |
| Samsung | Yes | We also think it is good to clarify the UE behaviour in this case, and the proposed change is reasonable. |
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**Summary for Q4:**

# 3 Conclusion

In this document the following proposals have been made:

# References

1. R2-2408945 *Miscellaneous Rel-18 LTM Aspects and Corrections* 3GPP TSG-RAN WG2 Meeting #127bis Hefei, China, 14th – 18th of October 2024
2. R2-2408452 *Misc state 2 corrections for LTM mobility* 3GPP TSG-RAN WG2 Meeting #127bis Hefei, China, 14th – 18th of October 2024
3. R2-2408632 *TP for Stage 2 coexistence case* 3GPP TSG-RAN WG2 Meeting #127bis Hefei, China, 14th – 18th of October 2024