3GPP TSG-RAN WG2 #121bis-e R2-230xxxx

Electronic meeting, 17th – 26th April 2023

Agenda Item: 7.4.2

Source: Ericsson

Title: Summary of [AT121bis-e][017][eMob] RRC

Document for: Discussion, Decision

# 1 Introduction

This contribution is to address the following email discussion:

* [AT121bis-e][017][eMob] RRC (Ericsson)

 Scope: Review of RRC CR in R2-2304101, which doesn’t include this meetings agreements. Identify things that should be corrected and missing things.

 Intended outcome: Improved baseline RRC CR (no attempt to formally endorse), including editors Notes indicating Open Issues that should be addressed in the upcoming meetings.

 Deadline: EOM (offline only, can is needed extend to W2 Friday).

# 2 Contact details

Companies are encouraged to fill in the contact details in this table.

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| --- | --- | --- |
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# 3 Comments on RRC running CR in [R2-2304101](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/%0DR2-2304101.zip)

Companies are encouraged to review the RRC running CR for LTM in [R2-2304101](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/%0DR2-2304101.zip) and provide comments in the following table.

**Q1. Please state your comments about the provided RRC running CR for LTM in** [**R2-2304101**](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/%0DR2-2304101.zip)**.**

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| Company | Comment(Please specify for which section of the spec the comment is) |
| MediaTek | Sec. 6.3.2* We believe that *ltm-CellSwitchInfo* for LTM serves a similar purpose as *reconfigurationWithSync* for RRC-based handover. However, this IE is not mentioned in the procedural text in Sec. 5.
* The name of new IE *LTM-CandiadteConfig* may be confusing in that it contains *lt~~e~~m-ReferenceConfiguration* and *ltm-CandidateToAddModList*. We suggest renaming the IE as *LTM-Config*.
* RAN2 just agreed that “RRC RACH configuration for early TA acquisition (e.g., including whether RAR needs to be received) is specific per target cell and is signalled separately (separate IEs) from the candidate cell configuration.” Therefore, such early RACH configurations should also be included in LTM-Config. For example,

LTM-Config-r18 ::= SEQUENCE { ltm-ReferenceConfiguration-r18 OCTET STRING (CONTAINING RRCReconfiguration), OPTIONAL, -- Cond FirstLTM-Candidate ltm-CandidateToReleaseList-r18 LTM-CandidateToReleaseList-r18 OPTIONAL, -- Need N ltm-CandidateToAddModList-r18 LTM-CandidateToAddModList-r18 OPTIONAL, -- Need N ltm-CandidateResetL2-List-r18 SetupRelease { LTM-CandidateResetL2-List-r18 } OPTIONAL -- Need M ltm-EarlyRACH-ConfigToReleaseList LTM-EarlyRACH-ConfigToReleaseList OPTIONAL, -- Need Nltm-EarlyRACH-ConfigToAddModList LTM-EarlyRACH-ConfigToAddModList OPTIONAL, -- Need N  ...}LTM-CandidateToReleaseList-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsLTM-r18)) OF LTM-CandidateId-r18 OPTIONAL -- Need NLTM-CandidateToAddModList-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsLTM-r18)) OF LTM-Candidate-r18LTM-Candidate-r18 ::= SEQUENCE { ltm-CandidateId-r18 LTM-CandidateId-r18, ltm-Config-r18 OCTET STRING (CONTAINING RRCReconfiguration), ltm-ConfigComplete-r18 ENUMERATED {true} OPTIONAL -- Need R ...}LTM-CandidateResetL2-List-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsLTM-r18)) OF LTM-CandidateId-r18LTM-EarlyRACH-ConfigToReleaseList SEQUENCE (SIZE (1..maxNrofCellsLTM)) OF LTM-CandidateId OPTIONAL, -- Need NLTM-EarlyRACH-ConfigToAddModList SEQUENCE (SIZE (1..maxNrof maxNrofCellsLTM)) OF LTM-EarlyRACH-Config OPTIONAL, -- Need NLTM-EarlyRACH-Config-r18 ::= SEQUENCE { ltm-CandidateId-r18 LTM-CandidateId-r18, ltm-EarlyRACH-Config-r18 RACH-ConfigDedicated ...} |
| CATT | 1. There lacks the abbreviation for the term “LTM”, please add it.
2. In section “5.3.5.1 General”:

The RRCReconfiguration message can also be used to release the LTM candidate cells, But the current running CR only refers the add/modify to the LTM candidate cells. 1. In section “5.3.5.2 Initiation”

I think only the LTM for MCG is covered by the following description in the running CR.“the *ltm-CandidateConfig* for LTM is included only when AS security has been activated, and SRB2 with at least one DRB are setup and not suspended”As for SN configured LTM, it can be configured only when at least one RLC bearer is setup in SCG. So it is suggested to distinguish these two cases with different conditions like what we do for CPC and CHO/CPA.1. In section “5.3.5.x LTM configuration and execution”

According to the running CR, each time NW reconfigure the LTM candidate cell configuration, UE need to perform the generation of the complete LTM configuration procedure **for all LTM candidates**, i.e., NW may only reconfigure LTM candidate#1, but UE has to re-generate the complete candidate LTM configuration for other LTM candidate#2/ LTM candidate#3, …, and LTM candidate #N, even these candidates remain unchanged. And also, in case some candidate cells are released by NW, UE should also release the corresponding complete LTM candidates for these candidate cell. But this is not feasible in the current running CR. So, how about we reorganize the structure, so that UE perform the corresponding actions on generation/release/modification(re-generation) the complete LTM configuration in accordance with the add/modify/release of the LTM candidate configuration and/or the reference configuration as indicated by NW. Just like what I summary in the following table.

|  |  |
| --- | --- |
| Configurations changed by NW | UE behaviour on the (generation of) complete candidate configuration  |
| Reference configuration is reconfigured | UE need to generate the complete LTM configuration for **all** candidate cells.  |
| Release some/all candidate configuration via the *ltm-CandidateToReleaseList* | UE only need to release the corresponding complete LTM configurations for these cells released by NW. |
| Add some candidate configuration via the *ltm-CandidateToAddModList* | UE only need to generate the corresponding complete LTM configurations for these cells newly added by NW. |
| Modify some candidate configuration via the *ltm-CandidateToAddModList* | UE only need to re-generate the corresponding complete LTM configurations for these cells modified by NW. |

1. In section “5.3.5.x.4 Generation of UE LTM configuration”

2> if *ltm-Candidate* includes *ltm-ConfigComplete*;3> generate a complete LTM candidate cell configuration for the received *ltm-Candidate* according to the actions described in clause 5.3.5.3 and store it in *ue-LTM-Config* within *VarLTM-UE-Config*.2> else:3> generate a complete LTM candidate cell configuration by applying *ltm-Candidate* on top of *referenceConfiguration* according to the actions described in clause 5.3.5.3 and store it in *ue-LTM-Config* within *VarLTM-UE-Config*.To my understanding, we only agreed UE can generate the LTM complete candidate configuration before cell switch, but this does not mean UE has to apply the configuration before the cell switch. The clause 5.3.5.3 specifies the UE behaviour on how to apply the configuration in the received RRC Reconfiguration message. So why the running CR says UE generate the LTM candidate cell configuration according to the actions described in clause 5.3.5.3? And, also if the reference configuration is empty, i.e., the LTM candidate cell configuration is complete, UE can directly store the received LTM candidate cell configuration in the *VarLTM-UE-Config*. So, the “generate a complete LTM candidate cell configuration for the received *ltm-Candidate* according to the actions described in clause 5.3.5.3 and” in the first step 3 is not needed for this case, 1. In section “5.3.5.x.5 LTM cell switch execution”
* We prefer to leave FFS on the UE behaviour on what dedicated configuration can be cleared upon LTM cell switch is triggered, since this is not agreement and we think what configuration can be released or maintained still depend on the cell switch type, i.e., intra-DU or inter-DU cell switch.
* The C-RNTI should be released at this case. Anyway, NW will configure the new C-RNTI for each LTM candidate configuration. Please note that in legacy full configuration procedure, the C-RNTI can be kept only the re-establishment case.
* As for maintain the “the UE variables *VarLTM-Config* and *VarLTM-UE-Config*.”, this depends on whether it is subsequent LTM or non-subsequent LTM.
* As for “acquire the MIB of the target SpCell as indicated in the LTM candidate cell configuration indicated by lower layers, which is scheduled as specified in TS 38.213 [13], if applicable;”, this can be done in advance of the LTM cell switch command. Prefer to add the following note like legacy.

NOTE 2: The UE may omit reading the *MIB* if the UE already has the required timing information, or the timing information is not needed for random access.* As for handling of the T316, T316 can start open when MCG failure happens. But if MCG failure, why LTM cell switch can still be triggered?
* As for the following description extracted from the running CR, UE perform some repeated behaviours, i.e., behaviour highlighted in blue and the behaviour highlighted in green. Since the spCellConfigCommon/RACH configure/PDCP configuration/BCCH configuration are part of the LTM candidate configuration, so when UE perform the behaviour highlighted in green, this means the behaviour highlighted in blue is also performed, right?

1> apply the value of the *newUE-Identity* as the C-RNTI for this cell group according to the LTM candidate cell configuration related to the the LTM candidate cell configuration identity as received by lower layers;1> configure lower layers in accordance with the received *spCellConfigCommon* according to the LTM candidate cell configuration indicated by lower layers;1> configure lower layers in accordance with the received *rach-ConfigDedicated* according to the LTM candidate cell configuration indicated by lower layers.1> configure the PDCP entity for LTM candidate cell configuration indicated by lower layers with state variables continuation as specified in TS 38.323 [5], and with the same security configuration as the PDCP entity for the source cell group;1> stop timer T310 for the corresponding SpCell, if running;1> if this procedure is executed for the MCG:2> if timer T316 is running;3> stop timer T316;1> stop timer T312 for the corresponding SpCell, if running;1> apply the specified BCCH configuration defined in 9.1.1.1 for the target LTM candidate cell configuration;1> acquire the MIB of the target SpCell as indicated in the LTM candidate cell configuration indicated by lower layers, which is scheduled as specified in TS 38.213 [13], if applicable;1> apply the LTM configuration in *UE-LTM-Config* within *VarLTM-UE-Config* related to the LTM candidate cell configuration identity as received by lower layers.* For “apply the LTM configuration in *UE-LTM-Config* within *VarLTM-UE-Config* related to the LTM candidate cell configuration identity as received by lower layers.”, Should we specify the behaviour by referring to the 5.3.5.3?
1. In section 6.3.2
* lte-ReferenceConfiguration-r18 within the *LTM-CandidateConfig,*

since we already agreed the reference configuration can be empty, so how about make it as choice, within the choice structure, one is the included RRCReconfiguration, the other is the null. Like the following example:LTM-CandidateConfig-r18 ::= SEQUENCE {lte-ReferenceConfiguration-r18 CHOICE { NonEmptyReferenceConfiguraton OCTET STRING (CONTAINING RRCReconfiguration), Spare NULL, }, ltm-CandidateToReleaseList-r18 LTM-CandidateToReleaseList-r18 OPTIONAL, -- Need N ltm-CandidateToAddModList-r18 LTM-CandidateToAddModList-r18 OPTIONAL, -- Need N ltm-CandidateResetL2-List-r18 SetupRelease { LTM-CandidateResetL2-List-r18 } OPTIONAL -- Need M ...}* *ltm-CandidateResetL2-List-r18* within the *LTM-CandidateConfig*,

as for the details of the configuration to indicate L2 reset, Please leave it FFS.This is not an agreement. Even we discussed in offline discussion 021 last meeting, but no conclusion is made on the following candidate solutions. - To configure set list in parallel with the candidate cell’s configuration, and within the list, either a) or b) or c) can be included. - To indicate a set ID within each LTM candidate.* For LTM-CandidateId, there lacks the definition of this IE.
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| OPPO | * 5.3.5.x.3

The UE shall:1> for each *ltm-CandidateId* in the *ltm-CandidateToAddModList*:2> if the current *VarLTM-Config* includes an *ltm-Candidate* with the given *ltm-CandidateId*:3> modify the *ltm-Candidate* within *VarLTM-Config* in accordance with the received *ltm-Candidate*;2> else:3> add the received *ltm-Candidate* to *VarLTM-Config*.For CHO/CPA/CPC, when UE receive a newly provide candidate configuration with same candidate ID as previous received one, UE performs replacement other than modification. We think the same operation can be reused for LTM. Furthermore, LTM candidate can be configured as delta configuration, the delta configuration may not be modified by another delta configuration. For the highlighted sentence, it is suggested to change ‘modify’ to ‘replace’’. In addition, the update of reference configuration is missing in current running CR.* Section 6.3.2

For CellGroupConfig IE, a new field ltmCellSwitchInfo is introduced to configure necessary LTM information which is not agreed. In our understanding, this may not be needed since we can reuse RRCReconfigurationwithsync. Although UE’s behaviour is different for LTM compared to legacy RRC Reconfiguration with sync, it can be explained by the text.* Section 6.3.2

In LTM-CandidateConfig IE, ltm-ConfigComplete-r18 is introduced to indicate whether an LTM candidate configuration is complete configuration or delta configuration. We have not agreed to introduce this indication and further discussion is needed. For ltm-CandidateNoResetL2-List, we understand the motivation is to indication whether L2 reset needs to be performed. But this is not an agreement for now.  |
| Intel | Section 5.3.5.1: add/modify LTM candidate cells. Should also include release LTM candidate cellsSection 5.3.5.x.11> store the received *ltm-ReferenceConfiguration* in *VarLTM-Config,* if present;Our understanding is the ltm-ReferenceConfiguration is mandatory but it can be empty which means full configurationSection 5.3.5.x.5We also need to add procedure to determine if LTM is intra-DM or inter-DM. May be it can add editorial note.  |
| Samsung | 1. In section 5.3.5.x.1 GeneralUE needs to maintain two independent UE variables for VarLTM-Config and VarLTM-UE-Config, one each for MCG and SCG. This might be captured in section 5.3.5.x.1 General as below (similar to CHO):In NR-DC, the UE may receive two independent *ltm-CandidateConfig**-* a *ltm-CandidateConfig* associated with MCG, that is included in the *RRCReconfiguration* message received via SRB1; and- a *ltm-CandidateConfig*, associated with SCG, that is included in the *RRCReconfiguration* message received via SRB3, or, alternatively, included within a *RRCReconfiguration* message embedded in a *RRCReconfiguration* message received via SRB1.In this case:- the UE maintains two independent *VarLTM-Config*, one associated with each *ltm-CandidateConfig*;- the UE maintains two independent *VarLTMUE-Config*, one associated with each *ltm-CandidateConfig*;- the UE independently performs all the procedures in clause 5.3.5.x for each *ltm-CandidateConfig* and the associated *VarLTM-Config and VarLTMUE-Config*, unless explicitly stated otherwise;2. In section 5.3.5.x.5 LTM cell switch executionAs T310 and T312 are stopped, the counters also need to be reset.source cell group;1> stop timer T310 for the corresponding SpCell, if running;1> if this procedure is executed for the MCG:2> if timer T316 is running;3> stop timer T316;1. stop timer T312 for the corresponding SpCell, if running;
2. reset the counters N310 and N311;

1> apply the specified BCCH configuration defined in 9.1.1.1 for the target LTM candidate cell configuration;3. We suggest below editorial corrections. -- Serving cell specific MAC and PHY parameters for a SpCell:SpCellConfig ::= SEQUENCE { servCellIndex ServCellIndex OPTIONAL, -- Cond SCG reconfigurationWithSync ReconfigurationWithSync OPTIONAL, -- Cond ReconfWithSync rlf-TimersAndConstants SetupRelease { RLF-TimersAndConstants } OPTIONAL, -- Need M rlmInSyncOutOfSyncThreshold ENUMERATED {n1} OPTIONAL, -- Need S spCellConfigDedicated ServingCellConfig OPTIONAL, -- Need M ..., [[ lowMobilityEvaluationConnected-r17 SEQUENCE { s-SearchDeltaP-Connected-r17 ENUMERATED {dB3, dB6, dB9, dB12, dB15, spare3, spare2, spare1}, t-SearchDeltaP-Connected-r17 ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5, spare4, spare3, spare2, spare1} } OPTIONAL, -- Need R goodServingCellEvaluationRLM-r17 GoodServingCellEvaluation-r17 OPTIONAL, -- Need R goodServingCellEvaluationBFD-r17 GoodServingCellEvaluation-r17 OPTIONAL, -- Need R deactivatedSCG-Config-r17 SetupRelease { DeactivatedSCG-Config-r17 } OPTIONAL -- Cond SCG-Opt ]], ltmCellSwitchInfo SetupRelease { LtmCellSwitchInfo } OPTIONAL -- Need M}We suggest to change ltmCellSwitchInfo with ltm-CellSwitchInfo and LtmCellSwitchInfo with Ltm-CellSwitchInfo asLtm-CellSwitchInfo SetupRelease { Ltm-CellSwitchInfo }Similarly, for the below SEQUENCE definition also, LtmCellSwitchInfo-r18 may be changed to Ltm-CellSwitchInfo-r18. LtmCellSwitchInfo-r18 ::= SEQUENCE { spCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Need M newUE-Identity RNTI-Value, rach-ConfigDedicated CHOICE { uplink RACH-ConfigDedicated, supplementaryUplink RACH-ConfigDedicated } OPTIONAL, -- Need N}This change may be reflected in the procedure text too.4. We agree with CATT’s comments that UE performs the corresponding actions on generation/release/modification(re-generation) the complete LTM configuration in accordance with the add/modify/release of the LTM candidate configuration and/or the reference configuration as indicated by NW. We also think that there should be an option for releasing the Reference configuration (for e.g. when all the candidates have complete configuration).Thus we slightly modify the below

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| --- | --- |
| Configurations changed by NW | UE behaviour on the (generation of) complete candidate configuration  |
| Reference configuration is ~~reconfigured~~ modified. | UE need to generate the complete LTM configuration for **all** candidate cells for which ltm-ConfigComplete is not true.  |
| Reference configuration is released | UE need to release the complete LTM configuration for **all** candidate cells for which ltm-ConfigComplete is not true |

5.We also agree to CATT’s comments on T316. UE may not report LTM measurements or receive cell switch command from MCG upon starting T316 (as in legacy handover). However UE may still receive cell switch command from SCG while T316 is started and in that case T316 needs to be stopped.Hence we suggest to modify as below:1> if this procedure is executed for the ~~M~~SCG:2> if timer T316 is running;1. stop timer T316;

6.In the field description for CellGroupConfig, for ltmCellSwitchInfo change target to candidateThis field contains necessary information for the UE to execute an LTM cell switch procedure in case this cell is a LTM ~~target~~ candidate cell.7. In the LTM candidateConfig-r18, we need lists rather than a single list for ltm-CandidateResetL2-List-r18, due to possibility of subsequent LTM to another DU. It may be efficient to include the list of cells, for which full reset need not be performed to avoid duplication. The cells belonging to same DU may be within one list, thus a candidate cell may be present in only one list.LTM-CandidateConfig-r18 ::= SEQUENCE { lte-ReferenceConfiguration-r18 OCTET STRING (CONTAINING RRCReconfiguration), OPTIONAL, -- Cond FirstLTM-Candidate ltm-CandidateToReleaseList-r18 LTM-CandidateToReleaseList-r18 OPTIONAL, -- Need N ltm-CandidateToAddModList-r18 LTM-CandidateToAddModList-r18 OPTIONAL, -- Need N ltm-CandidateResetL2-Lists-r18 SetupRelease { LTM-CandidateResetL2-List-r18 } OPTIONAL -- Need M ...}LTM-CandidateToReleaseList-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsLTM-r18)) OF LTM-CandidateId-r18 OPTIONAL -- Need NLTM-CandidateToAddModList-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsLTM-r18)) OF LTM-Candidate-r18LTM-Candidate-r18 ::= SEQUENCE { ltm-CandidateId-r18 LTM-CandidateId-r18, ltm-Config-r18 OCTET STRING (CONTAINING RRCReconfiguration), ltm-ConfigComplete-r18 ENUMERATED {true} OPTIONAL -- Need R ...}ltm-CandidateResetL2-Lists-r18 ::= SEQUENCE (SIZE (1..maxNrofCandidateResetL2-List)) OF LTM-CandidateResetL2-List-r18 LTM-CandidateResetL2-List-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsLTM-r18)) OF LTM-CandidateId-r18Further the definition has to be updated as***ltm-CandidateNoResetL2-List***This field includes a list of LTM candidate cell identifiers for which the full L2 reset is not needed upon an LTM cell switch where the source and target are in the same list. A LTM candidate cell can be present in only one ***ltm-CandidateNoResetL2-List.***8.Reference configuration needn’t be mandatory for the first LTM candidate configuration, if all the candidates are provided with complete configuration. This also provides flexibility for an operator to deploy LTM with complete configuration alone, if they wish.Hence we suggest to update the explanation for **FirstLTMCandidate** as below.This field is mandatory present upon the first configuration of LTM-CandidateConfig where there is at least one candidate with cellltm-ConfigComplete-r18 is not true. Otherwise, the field is optionally present, Need M. |
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# 4 Other open issue that need to be addressed in the RRC running CR

In the RRC running CR for LTM in [R2-2304101](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/%0DR2-2304101.zip) a series of open issues are captured in order to highlight what aspects are not captured yet and that need to be addressed before to provide a possible implementation. Companies are encouraged to highlighted in the following table any other open issue that deserve to be discussed or captured for the RRC running CR.

**Q1. Is there any other open issue that need to be addressed in the RRC running CR for LTM in** [**R2-2304101**](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/%0DR2-2304101.zip)**?**

|  |  |
| --- | --- |
| Company | Comment(Please specify for which section of the spec the comment is) |
| Xiaomi | Issue 1: FFS whether we need two separate “ltm-CandidateConfig”, one “ltm-MCGCandidateConfig” for MCG and one “ltm-SCGCandidateConfig” for SCG, so that the UE can know whether the configuration is for MCG or SCG when the MN is able to provide both MCG candidate configuration and SCG candidate configuration. Issue 2: FFS how to handle the L3 RRM measurement configuration after cell switching.  |
| MediaTek | For LTM operation, UE needs some information about candidate cells before cell switch. In addition to RACH configurations for early TA acquisition, such information also includes L1 measurement RS configuration, TCI states, etc. The related configurations should be considered as open issues if we cannot conclude in this meeting. |
| CATT | 1. FFS how UE to decide this is subsequent LTM or non-subsequent LTM, as this may impact whether to delete the LTM configuration after the cell switch is executed.
2. FFS how to indicate the L2 reset via RRC configuration.
3. FFS UE behaviour on application of the complete LTM candidate configuration upon LTM cell switch, i.e., which part of the configuration should be maintained by UE.
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| OPPO | According to RAN1 agreement, whether RAR needs to be received is configured by RRC. Further discussion is needed on how to capture this agreement in RRC CR. |

# 5 Conclusion

Based on the discussion in the previous sections the following is proposed:

# 6 References

1. [R2-2304101](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304101.zip), RRC running CR for LTM, Ericsson, RAN2#121bis-e, Online, 17th - 26th April, 2023