**3GPP TSG-RAN WG3 Meeting #123 R3-24xxxx**

**Athens, GR, 26 Feb – 01 Mar, 2024**

Agenda Item: 9.1.5.1

Source: Huawei

Title: Summary offline discusison for LTM

Document for: Discussion

# Introduction

This document contains the minutes and conclusions made during the offlien discussion for LTM held at 27, Feb from 17:00 to 19:00.

# Proposals for Chair notes

**New parameters from RAN1 LS:**

RAN3 agrees to include the ltm-EarlyUL-SyncConfigSUL, the ltm-nzp-CSI-RS-Resource List, and the PathlossReferenceRS in F1.

The encoding for ltm-nzp-CSI-RS-Resource List, and the PathlossReferenceRS is pending to RAN2. May be by OCTET STRING.

**CFRA resource allocation for subsequent LTM:**

change the source gNB-DU ID to a list of candidate gNB DU ID including the source in UE context setup request/UE context modification request in LTM preparation.

Add a list of Preamble Index linked with the RACH Configuration to both UE CONTEXT SETUP RESPONSE and UE CONTEXT MODIFICATION RESPONSE message.

Add a list of Preamble Index linked with the RACH Configuration to the Early Sync Information List within UE CONTEXT MODIFICATION REQUEST message.

**FFS on whether to use an explicit IE or a container, e.g., RACH-Dedicated?**

**early sync configuration transfer:**

send a list of early RACH configuration prepared by different candidate gNB DUs to the new serving DU for example, after cell switch command, or step 7 and 8, or after access success.

**TA value transfer:**

The target DU receives the valid TA values for subsequent LTM in Cell Chang Notification.

FFS on which node decides the TA value is valid and the need of the validity timer.

**TA=0:**

The gNB-CU provides the TA =0 to the source gNB-DU and other candidate gNB-DUs.

**Same TA value as source:**

Option 1: candidate DU response to the CU about the same TA value as source information.

Option 2: source DU determines whether the candidate Cell’s TA is same as source.

**UE Based TA measurement:**

The gNB-CU assigns the ltm-UE-MeasuredTA-ID and ltm-ServingCellUE-MeasuredTA for UE based TA measurement.

The gNB-CU indicates the IDs of UE based TA measurement for each candidate cell and source cell to the source gNB-DU via UE context Modification Request message.

Alao check proposals in [R3-240357](file:///D:\RAN3\123\Docs\R3-240357.zip)

**Open issues:**

Removing the source gNB-DU ID in the CU-DU TA INFORMATION TRANSFER message

Open issues identified in the offline (blue above)

RACH Resource Prioritization for LTM Recovery

CFRA resource for the RACH based access

LTM Interworking with NR-DC

L3 HO with configured LTM

L2 no reset configuration

Other corrections in the not opened CRs.

# Discussion

## Remaining issues

#### Issue 1: New parameters from RAN1 LS

Huawei:

Proposal 1: To add the ltm-EarlyUL-SyncConfigSUL, the ltm-nzp-CSI-RS-Resource List, and the PathlossReferenceRS in UE Context Setup Response message and UE Context Modification Response message.

Proposal 2: To add the *ltm-EarlyUL-SyncConfigSUL* in UE Context Modification Request message.

RAN3 agrees to include the ltm-EarlyUL-SyncConfigSUL, the ltm-nzp-CSI-RS-Resource List, and the PathlossReferenceRS in F1.The encoding for ltm-nzp-CSI-RS-Resource List, and the PathlossReferenceRS is pending to RAN2. May be by OCTET STRING.

Samsung:

**Proposal 1-1: the early TA configuration should be provided by gNB-DU for NUL and SUL, respectively.**

**Proposal 1-2: the early TA configuration should be provided to gNB-DU for NUL and SUL, respectively, for each candidate cell.**

**LTM-TCI-Info encoding：**

Ericsson:

Revise the TCI States Configurations List IE to reference the newly defined RRC IE.

Includes the ltm-nzp-CSI-RS-Resource List, and the PathlossReferenceRS

#### Issue 2: Early RACH related

CFRA resource allocation for subsequent:

Huawei, Samsung: To change the source gNB-DU ID to a list of source gNB ID containing the source gNB-DU and all other candidate gNB-DUs in the UE Context Setup Request.

change the source gNB-DU ID to a list of candidate gNB DU ID including the source in UE context setup request/UE context modification request in LTM preparation.

send a list of early RACH configuration prepared by different candidate gNB DUs to the new serving DU for example, after cell switch command, or step 7 and 8, or after access success.

Allocating Preamble Index(es)**:**

Ericsson:

Add a list of Preamble Index linked with the RACH Configuration to both UE CONTEXT SETUP RESPONSE and UE CONTEXT MODIFICATION RESPONSE message.

Add a list of Preamble Index linked with the RACH Configuration to the Early Sync Information List within UE CONTEXT MODIFICATION REQUEST message.

**FFS on whether to use an explicit IE or a container, e.g., RACH-Dedicated?**

QC:

**Proposal 1. For early TA acquisition, CU initiates a request to a candidate DU to allocate CFRA resources, e.g., RAP IDs, for other candidate DUs (including the serving DU). The request message, which uses non-UE associated F1-AP signalling, includes:**

* **List of candidate DUs,**
* **Suggested list of LTM candidate cells.**

**Proposal 2. In response, the candidate DU indicates to the CU allocated CFRA resources, e.g., the pool of RAP IDs, for each other candidate DU and for each candidate cell. The response message, which uses non-UE associated F1-AP signalling, includes:**

**For each prepared LTM candidate cell:**

* **Candidate DU ID,**
* **List of RAP IDs for the candidate DU.**

**Proposal 3. Upon receiving the response from candidate DU, the CU forwards the List of RAP IDs to each other candidate DU. The message, which again uses non-UE associated F1-AP signalling, includes:**

* **Candidate DU ID,**
* **LTM candidate cell ID,**
* **List of RAP IDs.**

**Proposal 4. For early TA acquisition, a candidate DU can signal the allocated CFRA resources, e.g., the pool of RAP IDs, using the existing UE associated F1-AP signalling for LTM – UE Context Setup Response and UE Context Modification Response messages. information can be included inside the Early Sync Information IEs in the messages (see Figure 2, Figure 3).**

**Proposal 5. RAN3 is requested to consider and choose between the two alternatives described above for signalling of allocated CFRA resources for early TA acquisition.**

**Samgung:**

**Proposal 1-3: for both RACH-less and RACH-based CFRA, the candidate gNB-DU provide the RACH configuration by including RACH-ConfigDedicated IE.**

**Proposal 1-4: for each candidate cell, the candidate gNB-DU can provide two sets of RACH resource, one for early UL synchronization, and one for the CFRA via LTM cell switch MAC CE.**

early sync configuration transfer:

E///:

Solution 1: source DU transmits the early sync configurations of itself and other candidate DUs to the CU during the DU-CU Cell Switch Notification procedure.

Solution 2: CU obtains all and then transfer to all candidate Dus including source DU in LTM configuration.

#### Issue 3: TA value transfer

Huawei:

The source gNB-DU or the CU forwards the valid TA values to the target gNB-DU for subsequent LTM in Cell Change Notification message.

The target DU receives the valid TA values for subsequent LTM in Cell Chang Notification.

FFS on which node decides the TA value is valid and the need of the validity timer.

#### Issue 4: same TA as source and TA = 0

Huawei:

Proposal 5: The candidate gNB-DU provides information about “same TA value as source” (i.e., the list of candidate cells with same TA) and information about TA=0 to the gNB-CU in LTM configuration phase.

Proposal 6: The candidate gNB-CU provides both information to the source gNB-DU and other candidate gNB-DUs.

Nokia：

***Proposal 1: gNB-CU informs the Source gNB-DU if an LTM prepared target cell has a known “TA value = 0” as part of LTM configuration in the preparation phase.***

***Proposal 2: Determination of TA value of target cell to be same as source cell is up to gNB-DU implementation.***

***Proposal 3: A Source gNB-DU indicates to gNB-CU via F1AP whether it has determined that a source and target cell pair has same TA value and hence does not require early TA acquisition between this cell pair.***

***Proposal 4: A gNB-CU can decide not to request Candidate gNB-DU to provide RACH resources for TA acquisition.***

***TA=0:***

The gNB-CU provides the TA =0 to the source gNB-DU and other candidate gNB-DUs.

Which node decides the cell’s TA is 0?

Option1: candidate DU provides it in UE context setup response /F1 setup request.

Option 2: CU knows. (OAM configured)

***Same TA value as source:***

***Option 1: candidate DU response to the CU about the same TA value as source information.***

***Option 2: source DU determines whether the candidate Cell’s TA is same as source.***

#### Issue 5: UE Based TA measurement:

Huawei:

If the gNB-CU decides to use UE based TA measurement, it may explicitly request the source gNB-DU and the candidate gNB-DUs to provide the configuration for UE based TA measurement in LTM configuration phase

The gNB-CU assigns the ltm-UE-MeasuredTA-ID and ltm-ServingCellUE-MeasuredTA for UE based TA measurement.

The gNB-CU indicates the IDs of UE based TA measurement for each candidate cell and source cell to the source gNB-DU via UE context Modification Request message.

Alao check proposals in [R3-240357](file:///D:\RAN3\123\Docs\R3-240357.zip)

Rakuten Mobile.:

*Observation 1: UE-based TA measurement is based on UE capability and is configured by the gNB-CU using RRC signalling.*

*Observation 2: UE-based TA measurement doesn’t require UE to perform RACH towards candidate cell to acquire TA.*

*Observation 3: UE-based TA measurement doesn’t require the candidate DU to reserve/signal RACH resources to perform UL sync and acquire TA, during LTM target cell preparation.*

*Observation 4: UE-based TA measurement doesn’t require the serving DU to provide TA along with the LTM cell switch command using a MAC CE*

**Proposal 2: RAN3 discusses the RACH resource reservation requirements for a UE configured with UE-based TA measurement and agrees solution to optimize RACH resources.**

#### Issue 6 Removing RA-RNTI:

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Proposal 8: Remove the RA-RNTI IE in both the DU-CU TA INFORMATION TRANSFER and CU-DU TA INFORMATION TRANSFER messages.

Proposal 9: Send an LS to RAN2 to inform them that RO Information is not needed in the TA Information Transfer procedures.

#### Issue 7: RACH Resource Prioritization for LTM Recovery

**Nokia：**

***Proposal 12: CFRA/CBRA resources for LTM recovery are not explicitly configured to the UE in addition to CFRA/CBRA resources for LTM handover.***

***Proposal 13: Target gNB-DU indicates over F1AP to gNB-CU if configured CFRA resources are shared or not.***

#### Issue 8: CFRA resource for the RACH based access

**CATT:**

**Proposal 5: DU provides CFRA resource related information to CU by the UE CONTEXT MODIFICATION RESPONSE message (inter-DU) or the UE CONTEXT SETUP RESPONSE message (intra-DU case).**

**Proposal 6: CU provides the collected CFRA resource related information from all the candidate cells to DU by the UE CONTEXT MODIFICATION REQUST message.**

**Proposal 7: CU provides all the received CFRA resource to the source DU by the UE CONTEXT MODIFICATION RESPONSE message**

**Proposal 8: Whether provide CFRA resource is pend on DU, CU no needs to request the CFRA resource explicitly.**

#### Issue 9: Transferring Candidate Cell Configuration:

E///:

a design limitation arises: the DU cannot include both the CellGroupConfig for PCell reconfiguration and the CellGroupConfig of the candidate cell at the same time.

Proposal 6: Introduce a new IE named LTM Candidate Cell Configuration in the UE CONTEXT SETUP RESPONSE and UE CONTEXT MODIFICATION RESPONSE messages.

#### Issue 10: Removing the source gNB-DU ID:

E:/// Proposal 7: Remove the source gNB-DU ID in the CU-DU TA INFORMATION TRANSFER message, and update stage-2 accordingly.

#### Issue 11: LTM Interworking with NR-DC

Nokia:

***Proposal 5: MN and SN cannot perform simultaneous LTM configuration.***

* Scenario 1: NR-DC configured, LTM is configured in MN (MCG)
* Scenario 2: NR-DC configured, LTM is configured in SN (SCG)

**Solutions for avoiding simultaneous LTM configuration at MN (MCG) and SN (SCG)**

***Proposal 6: In case of NR-DC, MN indicates to SN whether MN has decided to configure LTM in MCG.***

***Proposal 7: In case of NR-DC, MN indicates to SN when LTM in MCG has been released.***

***Proposal 8: In case of NR-DC, SN indicates to MN whether SN has decided to configure LTM in SCG.***

***Proposal 9: In case of NR-DC, SN indicates to MN when LTM in SCG has been released***

**Another variation of Scenario 1: Intra-SN L3 based PSCell change when LTM is configured in MN (MCG)**

***Proposal 10: In case of NR-DC, if LTM is configured in MCG, the SN will indicate to MN that a PSCell change decision has taken place.***

***Proposal 11: In case of NR-DC, if LTM is configured in MCG, the SN will explicitly provide the updated SCG after PSCell change.***

#### Issue 12: L3 HO with configured LTM

Samsung:

**Proposal 2-1: the CSI resource configuration IE is put outside of LTM information setup/modify IE since such IE is needed when preparing LTM candidate cell, L3 HO target cell and target PSCell.**

**Proposal 2-2: during the preparation of L3 HO/PSCell change, the UE context setup request message should contain “Early Sync Information List” IE if the LTM configuration is kept at the UE side.**

**Proposal 2-3: the stage-2 flow chart on L3 HO can be updated to reflect the LTM related configurations.**

#### Issue 13: L2 no reset configuration

Samsung:

It is common understanding that the L2 reset should be applied for inter-DU cell switch.

**Proposal 3-1: RAN3 is kindly agree that the ServingCellNoReset ID and noResetID are needed for the gNB-DU.**

#### Issue 14: Other Issues may impact on ASN.1

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a design limitation arises: the DU cannot include both the CellGroupConfig for PCell reconfiguration and the CellGroupConfig of the candidate cell at the same time.

Proposal 6: Introduce a new IE named LTM Candidate Cell Configuration in the UE CONTEXT SETUP RESPONSE and UE CONTEXT MODIFICATION RESPONSE messages.

CATT:

**Proposal 1: Remove the unnecessary *LTM configuration ID* IE and *LTM Configuration mapping list ID* IE. E.g., *LTM configuration ID* IE in UE context setup/modification request message, *LTM Configuration Mapping List ID* IE in the UE context setup request message.**

**Proposal 2: Change the “TCI State ID” in “LTM Cell Switch Information” IE to “Joint or DL TCI State ID” IE, and add a “UL TCI State ID” IE for Separate TCI state case.**

**Proposal 3: Change the “L*TM Cell Switch Information* IE” in “*LTM Cell Switch Information*” IE to Manditory as the TCI state information should also be transferred from source DU to target DU.**

## Corrections

In case time allows.

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| **LTM stage2/3** | | |
| [R3-240701](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240701.zip) | Corrections to TS 38.470 to support LTM (ZTE, Ericsson, Huawei, CATT) | CR0135r, TS 38.470 v18.0.0, Rel-18, Cat. F |
| [R3-240552](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240552.zip) | Essential corrections for LTM in stage-2 (Ericsson) | draftCR |
| [R3-240469](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240469.zip) | Stage 2 update for LTM (Huawei) | CR0349r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240702](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240702.zip) | Corrections to TS 38.401 to support LTM (ZTE) | CR0360r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240507](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240507.zip) | Correction on LTM procedure (CMCC) | CR0354r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240201](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240201.zip) | Correction on LTM (Lenovo) | CR0332r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240322](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240322.zip) | Correction on stage 2 LTM (CATT) | CR0341r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240356](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240356.zip) | Correction of Rel-18 Intra-CU LTM stage-2 descriptions (LG Electronics Inc.) | CR0343r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240444](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240444.zip) | Corrections for LTM (Google Inc.) | CR0348r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240122](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240122.zip) | Correction for early sync of LTM (NEC) | CR0325r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240189](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240189.zip) | (CR to 38.401) Corrections on LTM procedures (China Telecommunication) | CR0330r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240472](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240472.zip) | Stage 2 update for remaining issues for LTM (Huawei) | CR0350r, TS 38.401 v18.0.0, Rel-18, Cat. F |
| [R3-240325](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240325.zip) | Introduce UL TCI state ID in the cell switch notification (CATT,ZTE,CMCC) | CR1296r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240553](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240553.zip) | Essential corrections for LTM over F1 (Ericsson) | CR1335r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240202](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240202.zip) | Correction on LTM (Lenovo) | CR1272r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240445](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240445.zip) | Correction for mobility enhancement (Google Inc.) | CR1316r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240323](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240323.zip) | Correction on stage 3 LTM (CATT) | CR1295r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240703](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240703.zip) | Corrections to TS 38.473 to support LTM (ZTE) | CR1354r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240121](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240121.zip) | Correction for early sync of LTM (NEC) | CR1255r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240357](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240357.zip) | Rel-18 LTM correction for UE-based TA measurement configuration from CU to DU (LG Electronics Inc.) | CR1299r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240473](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240473.zip) | Stage 3 update for remaining issues of LTM (Huawei) | CR1322r, TS 38.473 v18.0.0, Rel-18, Cat. F  Move to 9.1.5.1 |
| [R3-240059](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240059.zip) | Correction for early TA acquisition for LTM (Nokia, Nokia Shanghai Bell) | CR1251r, TS 38.473 v18.0.0, Rel-18, Cat. F  Move to 9.1.5.1 |
| [R3-240236](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240236.zip) | CR on remaining issues of LTM (Samsung) | CR1277r, TS 38.473 v18.0.0, Rel-18, Cat. F  Move to 9.1.5.1 |
| *9.1.5.2. ASN.1 review* **QUOTA: 2** | | |
| [R3-240070](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240070.zip) | Review of the description of the S-CPAC solution (Nokia, Nokia Shanghai Bell) | CR1116r, TS 38.423 v18.0.0, Rel-18, Cat. F |
| [R3-240321](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240321.zip) | ASN.1 correction for LTM (CATT) | CR1294r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240470](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240470.zip) | Stage 3 update for LTM (Huawei) | CR1321r, TS 38.473 v18.0.0, Rel-18, Cat. F |
| [R3-240554](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240554.zip) | Correction on the S-CPAC Multiple Target SN List (Ericsson) | CR1186r, TS 38.423 v18.0.0, Rel-18, Cat. F |
| [R3-240555](file:///C:\Users\Zhang%20Hongzhuo\Desktop\Docs\R3-240555.zip) | Correction on the LTM Cells To Be Released List (Ericsson) | CR1336r, TS 38.473 v18.0.0, Rel-18, Cat. F |

# Conclusion

# Reference

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| **LTM Remaining Issues** | | |
| [R3-240471](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240471.zip) | Discussion on LTM remaining issues (Huawei) | discussion |
| [R3-240551](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240551.zip) | Discussion on essential corrections for LTM (Ericsson) | discussion |
| [R3-240050](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240050.zip) | Discussion on Remaining Issues for LTM (Nokia, Nokia Shanghai Bell) | discussion |
| [R3-240065](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240065.zip) | Remaining issues in LTM (Qualcomm Incorporated) | discussion |
| [R3-240324](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240324.zip) | Further clarification about the unclearly point in LTM (CATT) | discussion |
| [R3-240235](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240235.zip) | Discussion on Remaining issues of LTM (Samsung) | Discussion  Move to 9.1.5.1 |
| [R3-240089](file:///C:\Users\Zhang%20Hongzhuo\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\05DEGQ3K\Docs\R3-240089.zip) | Open issues during resource reservation during LTM (Rakuten Mobile, Inc) | discussion |