**3GPP TSG-RAN WG3 #128 R3-253787**

**Malta, MT, 19th – 23th May 2025**

**Agenda item: 13.2**

**Source: Lenovo**

**Title: Summary of offline discussion on CB: # MobilityEhn\_LTMDC**

**Document for: Discussion and Decision**

# 1 Introduction

This contribution provides summary of offline discussion on CB: # MobilityEhn\_LTMDC.

**CB: # MobilityEhn\_LTMDC**

**- check offline with proposals not discussed during online.**

**- capture the agreements and update stage 2 and stage 3 TPs.**

**- list the open issues for next meeting.**

(Moderator - Lenovo)

Summary of offline in [R3-253787](Inbox\R3-253787.zip)

# 2 For the Chair’s Notes

# 3 Discussion

The agreements we made during online meeting:

**Inter-CU LTM in DC:**

Update the text description of CELL SWITCH NOTIFICATION message to capture the RAN3#127bis agreement: Include the target PSCell ID and corresponding TCI State ID(s) in the Cell Switch Notification message, and reusing the existing IEs.

Update the TA INFORMATION TRANSFER message to provide a list of TA values of multiple candidate cells.

The SCG reference configuration is provided by an implicit way in the CG-Config RRC container in the SN Change Required message, the SN Addition Request Acknowledge message (FFS) from the source SN/candidate SN to the MN.

The SCG reference configuration is provided by an implicit way in the CG-ConfigInfo RRC container in the SN Addition Request message from the MN to the candidate SN.

A per cell indicator indicating complete candidate configuration is included in the SN Addition Request Acknowledge message.

The SN Change Required message and the SN Modification Request message from MN to source SN should design a mechanism to support multiple candidate SNs, i.e., SN can include multiple candidate SNs information in a single SN Change Required message, and MN includes multiple candidate SNs information in a single SN Modification Request message.

The SN Addition Request message should design a mechanism to support single candidate SN, i.e., MN sends SN addition request towards only one candidate SN.

**Issue 1: Suggested PSCell list in SN Change Required (Source SN to MN)**

1. Implicit: Nokia (follow CPAC), ZTE, QC
2. Explicit: Lenovo, Ericsson, CT, CATT

**Moderator:** source SN may request the candidate SN to provide the L1 RS configuration and/or early sync configuration for some of the candidate PSCells, and the L1 RS configuration and/or early sync configuration are requested per cell, the suggested PSCell list should be included on an explicit way

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Suggested LTM Candidate PSCell List** |  | *1* |  |  | – |  |
| **>Suggested Candidate PSCell Item** |  | *1 .. <* *maxnoofLTMCells>* |  |  | – |  |
| >>PSCell ID | M |  | NR CGI  9.2.2.7 |  | – |  |
| >>Early Sync Information Request | O |  | 9.2.1.xx3 |  | – |  |
| >>CSI Resource Configuration Request | O |  | ENUMERATED (true, …) |  | – |  |

**Proposal 1: The suggested PSCell list should be explicitly included in the SN Change Required message.**

**Issue 2: maximum number of PSCells**

**Proposal 2-1: The maximum number of PSCells that can be prepared by each candidate SN is included in the SN Change Required message.**

**FFS on whether MN can provide assistance information (e.g., *maxNumberLTM-CandidatesSCG)* to the source SN**

**Issue 3: Configuration Mapping List**

the source SN may also provide the LTM Configuration ID Mapping List to the candidate SN via the MN, which will be used by the candidate SN to determine the PSCell ID from the LTM-CandidateID. For example, the source SN provides the LTM Configuration ID Mapping List to the MN via the SN Change Required message, and the MN sends the LTM Configuration ID Mapping List to the candidate SN using the SN Addition Request message.

**Proposal 3: The *LTM Configuration ID Mapping List* IE is included in the SN Change Required message and the SN Addition Request message.**

**Issue 4: Security**

Issue 4-1: how to transfer the S-Key information?

#### 9.2.3.xx1 LTM Security Configuration List

This IE is used to apply security in the S-NG-RAN node for inter-SN SCG LTM as defined in TS 37.340 [8].

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| --- | --- | --- | --- | --- |
| **LTM Security Configurations List** |  | *1* |  |  |
| **>LTM Security Configurations Item** |  | *1 .. <maxnoofSecurityConfigurations>* |  |  |
| >>S-NG-RAN node Security Key | M |  | BIT STRING (SIZE(256)) | The S-KSN which is provided by the M-NG-RAN node, see TS 33.501 [28]. |
| >>SK-counter | M |  | INTEGER (0..65535) |  |

**Proposal 4-1: The *LTM Security Configuration List* IE including a list of pair of {security key, sk-counter} is included in the (SN Addition Request message and the SN Modification Request message ?) (or Cell Switch Notification message?) to support subsequent inter-CU SCG LTM.**

**Proposal 4-2: The *SN Security Key* IE included in the SN Addition Request message and the SN Modification Request message should be ignored if the procedure is triggered for the LTM.**

Issue 4-2: How to allocate Rel-19 set ID of candidate PSCells (incl. Rel-19 set ID in the same SCG is same or not?)

Question 1: whether the Rel-19 set ID for different candidate PScells in a SCG should be same or can be different?

**Proposal 4-3: RAN3 assumes that the Rel-19 set IDs for different candidate PSCells in a SCG are same which means that the S-Key change for the PSCells within a SCG is not supported?**

Question 2: how to allocate Rel-19 set ID of candidate PSCells?

* MN allocates the Rel-19 set IDs for candidate PSCell: CT
* Source SN allocates the Rel-19 set IDs for candidate PSCell: ZTE
* MN sends Rel-19 set IDs to the S-SN and C-SN via SN modification message (sync-up info) CT, ZTE

**Proposal 4-4: FFS on how to allocate Rel-19 set ID of candidate PSCells in inter-CU LTM with DC??**

**Issue 5: SCG Reference Configuration**

Issue 5: Whether MN can request S-SN to provide the SCG reference configuration.

From moderator’s point of view, if the SCG reference configuration isn’t included in the SN Change Required message, it means the source SN doesn’t want to provide the SCG reference configuration to the MN. Otherwise, the source SN should always provide the SCG reference configuration to the MN during the SN Change procedure. In addition, in the RAN2 running CR for TS 37.340 [2], the MN can only request the candidate SN to provide the SCG reference configuration.

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| --- |
| 2. The MN requests each candidate SN to allocate resources for the UE by means of the SN Addition procedure. The MN may also provide a list of KSN and associated sk-Counter values for each candidate SN, and forward the received measurement results to each candidate SN(s). The MN may select one of the candidate SN(s) and request providing the reference SCG configuration as part of the SN Addition procedure. Once obtained, the MN provides the reference configuration to other candidate SN(s). |

**Proposal 5-1: If it has, the SN will provide the SCG reference configuration in the SN Change Required message and thus the MN cannot request source SN to provide the SCG reference configuration.**

**Issue 6-1: Data Forwarding**

**Proposal 6-1: Early data forwarding is supported in inter-CU LTM in DC.**

**Proposal 6-2: Normal data forwarding can be initiated after the source SN decides to trigger the LTM cell switch for the UE.** **The exact timing of its initiation is left to implementation.**

In Rel-17/18, we introduced several new IEs (e.g., CHO MR-DC Indicator, CHO MR-DC Early Data Forwarding Indicator, CPC Data Forwarding indicator) in XN-U ADDRESS INDICATION message as shown in the table below. The motivation was to trigger early data forwarding for CHO MR-DC or CPC scenarios.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| --- | --- | --- | --- | --- | --- | --- |
| Message Type | M |  | 9.2.3.1 |  | YES | reject |
| … |  |  |  |  |  |  |
| CHO MR-DC Indicator | O |  | ENUMERATED (true, ..., coordination-only) | Indicating that the XN-U ADDRESS INDICATION message is for Conditional Handover, as specified in TS 37.340 [8]. | YES | reject |
| CHO MR-DC Early Data Forwarding Indicator | O |  | ENUMERATED (stop, ...) |  | YES | ignore |
| CPC Data Forwarding indicator | O |  | ENUMERATED (triggered, early data transmission stop, ..., coordination-only) | Indicating that the XN-U ADDRESS INDICATION message is for a Conditional PSCell Change. | YES | reject |

Similar for LTM with DC:

**Proposal 6-3: Enhance XN-U ADDRESS INDICATION message to cover the LTM MR-DC and LTM PSCell change scenarios.**

**- Option 1: Introduce two indicators: LTM MR-DC data forwarding indicator and LTM PSCell change data forwarding indicator**

**- Option 2: to change the stage 3 descriptions, e.g., semantics and text**

**Issue 6-2: Notification of Access**

How to inform S-SN the UE successfully access to the target SN (i.e. for Late Data forwarding)

* Reuse HO Success (T-SN to MN) + SN modification request message (MN to S-SN): Ericsson, NEC
* Follow CPAC, reuse RRC Reconfiguration (UE to MN) + SN modification request message (MN to S-SN): CT, CATT

**Proposal 6-4: MN uses SN modification request message to notify the Source SN that UE has successfully accessed to the target SN.**

**FFS whether Handover Success is used from the target-SN to the MN to notify that UE has successfully accessed to the target SN.**

**Issue 7: CSI resource configuration**

Issue 7-1: Common CSI configuration

**Proposal 7-1: The source SN generates the common LTM CSI resource configuration for inter-CU SCG LTM and then provides the common LTM CSI resource configuration to the MN via the SN Modification Request ACK message.**

**Proposal 7-2: For the SSB based L1 measurement, the common CSI resource configuration may be included in the SN Change Required message and the SN Addition Request message.**

Issue 7-2: References to RRC spec

**Proposal 7-3: The *CSI Resource Configuration* IE is the common CSI resource configuration, which refers to the *ltm-CSI-ResourceConfig-r18* IE in the RRC spec.**

**Proposal 7-4: The *L1 Configuration* IE is the L1 RS configuration per candidate PSCell, which refers to the *ltm-SSB-Config-r18* IE in the RRC spec for the SSB based L1 measurement, or the *ltm-NZP-CSI-RS-ResourceConfigToAddModList-r19* IE associated with the *ltm-NZP-CSI-RS-ResourceSetToAddModList-r19* IE in the RRC spec for the CSI-RS based L1 measurement.**

**Issue 8: avoidance of simultaneous configurations**

To avoid the simultaneous configurations of inter-CU MCG LTM and inter-CU SCG LTM at the same time, RAN2 agreed the following solutions at RAN2#129bis meeting.

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| The indication on whether to allow or not the SN to configure an inter-SN candidate is included in the inter-node RRC message. We include this agreement in the LS to RAN3. |

Therefore, there is not RAN3 spec impact.

**Proposal 8-1: For the** **avoidance of simultaneous configurations of inter-CU MCG LTM and inter-CU SCG LTM, no RAN3 impact is foreseen.**

**Issue 9: LTM modification/cancel**

Case 1: candidate SN can decide to update or release some of the prepared candidate PSCells.

Case 2: source SN decides to update or release some of the suggested candidate PSCell

* Case 2-1: the source SN decides to add or release a candidate PSCell prepared at the source SN
* Case 2-2: the source SN decides to update the suggested candidate PSCells based on the latest L3 measurement results, or to update the upper limited number of PSCells of the candidate SN.

Moderator suggest that companies consider above use cases and continue to discuss the issue in next meeting.

**Proposal 9: FFS on whether LTM modification/cancel related procedures are needed.**

**Issue 10: other**

Issue 10-1: whether SP CSI-RS activation/(de)activation is also applied to the inter-CU LTM in DC?

**Proposal 10-1: FFS on whether CSI-RS activation/(de)activation is also applied to the inter-CU LTM in DC**

# 4 Text Proposals

Based on the spirit of Work split, the following TPs are proposed:

# References

|  |  |
| --- | --- |
| [R3-253008](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253008.zip) | LS on the support of semi-persistent CSI-RS resource for LTM CSI acquisition for candidate cells (RAN1(Fujitsu)) |
| [R3-253009](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253009.zip) | LS on RAN2 agreements for security key handling in inter-CU LTM (RAN2(ZTE)) |
| [R3-253710](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253710.zip) | Support for Semi-persistent CSI-RS transmission (Ericsson, Nokia, LG Electronics, Google, Jio Platforms) |
| [R3-253713](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253713.zip) | PRACH resources for RACH-less LTM (Ericsson, NTT DoCoMo, Lenovo, Jio Platforms, Verizon Wireless, Charter Communications) |
| [R3-253136](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253136.zip) | TP (BL CR TS 38.300, TS 38.401, TS 38.473, TS 38.423) Remaining issues on Inter-CU LTM procedure (Nokia) |
| [R3-253198](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253198.zip) | (TP to BL CR for TS 38.423 and 38.473 on Inter-CU LTM) Rel-19 inter-CU LTM issues (NEC) |
| [R3-253365](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253365.zip) | (TP for TS38.401) On support of inter-CU LTM (China Telecom) |
| [R3-253482](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253482.zip) | Further discussion on inter-CU LTM (Ericsson) |
| [R3-253561](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253561.zip) | Signalling enhancements for Inter-CU LTM handover (Qualcomm India Pvt Ltd) |
| [R3-253249](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253249.zip) | (TP for 38.423, 38.473, 38.401, 38.300) Inter-CU LTM Inter-CU LTM (ZTE Corporation) |
| [R3-253468](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253468.zip) | Discussion for general issues in Inter-CU LTM (CATT) |
| [R3-253654](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253654.zip) | Discussion on inter-gNB-CU LTM (Samsung) |
| [R3-253599](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253599.zip) | (TP for LTM BLCR for TS38.473, TS38.300): Further discussion on inter-CU LTM procedure (Huawei) |
| [R3-253554](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253554.zip) | gNB-DU initiated LTM resource reconfiguration (Rakuten Mobile, Qualcomm Inc, NTT Docomo Inc) |
| [R3-253600](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253600.zip) | (TP for LTM BLCR for TS38.423): Essential updates to XnAP BLCR (Huawei) |
| [R3-253659](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253659.zip) | (TP for NR\_Mob\_Ph4 TS 38.423 and TS 38.473) Discussions on remaining issues related to Inter-CU LTM security (LG Electronics Inc.) |
| [R3-253697](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253697.zip) | Discussion on inter-CU LTM (CMCC) |
| [R3-253676](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253676.zip) | Discussion on inter-CU LTM for non-DC and DC cases (NTT DOCOMO INC..) |
| [R3-253526](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253526.zip) | (TP to BL CRs 38.300 and 37.340) Clarification on RS configuration and CSI Resource Configuration (Google) |
| [R3-253660](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253660.zip) | Discussions on the remaining aspects of Inter-CU LTM (LG Electronics Inc.) |
| [R3-253324](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253324.zip) | [TP to BLCR for TS 38.401 and TS 38.423] Inter-CU LTM (Lenovo) |
| [R3-253655](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253655.zip) | (TP to BLCR for TS38.423 and TS38.473) Inter-gNB-CU LTM (Samsung) |
| [R3-253137](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253137.zip) | Discussion on Inter-CU LTM with Dual Connectivity (Nokia) |
| [R3-253199](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253199.zip) | Discussion Rel-19 inter-CU LTM in DC scenario (NEC) |
| [R3-253366](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253366.zip) | Discussion on inter-CU LTM in DC scenario (China Telecom) |
| [R3-253469](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253469.zip) | (TP for 37.340) Discussion for Inter-CU LTM in DC (CATT) |
| [R3-253518](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253518.zip) | Data forwarding for Inter-CU LTM DC scenarios (Ofinno, LLC) |
| [R3-253519](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253519.zip) | (TP for TS 38.423) Xn Support for Data forwarding for Inter-CU LTM DC scenarios (Ofinno, LLC) |
| [R3-253325](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253325.zip) | [TP to BLCR for TS 38.423] Inter-CU LTM in DC (Lenovo, Huawei, LG Electronics) |
| [R3-253250](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253250.zip) | (TP for 38.423, 37.340) SN initiate SCG LTM (ZTE Corporation) |
| [R3-253483](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253483.zip) | (TP for LTM BL CR for TS 38.423, TS 38.473, TS 38.300, TS 37.340) – Support for inter-CU LTM (Ericsson) |
| [R3-253520](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253520.zip) | Open Issues on SN initiated inter-CU SCG LTM (Ofinno, LLC) |
| [R3-253527](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253527.zip) | (TP to BL CR 38.423) Clarification on RS configuration and CSI Resource Configuration for MCG LTM (Google) |
| [R3-253528](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253528.zip) | (TP to BL CR 38.423) Clarification on RS configuration and CSI Resource Configuration for SCG LTM (Google) |
| [R3-253711](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253711.zip) | (TP to BL CR for TS 38.423) Xn support for Semi-persistent CSI-RS transmission (Ericsson, Nokia, LG Electronics, Google, Jio Platforms) |
| [R3-253712](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253712.zip) | (TP to BL CR for TS 38.473) F1 support for Semi-persistent CSI-RS transmission (Ericsson, Nokia, LG Electronics, Google, Jio Platforms) |
| [R3-253714](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253714.zip) | (TP to BL CR for TS 38.423) PRACH Resources for RACH-less LTM (Ericsson, NTT DoCoMo, Lenovo, Jio Platforms, Verizon Wireless, Charter Communications) |
| [R3-253715](file:///D:\3GPP%20WG%20TDOC\TSGR3_128\Docs\R3-253715.zip) | (TP to BL CR for TS 38.473) PRACH Resources for RACH-less LTM (Ericsson, NTT DoCoMo, Lenovo, Jio Platforms, Verizon Wireless, Charter Communications) |