**3GPP TSG RAN WG3#128 R3-253786**

**19th May – 23rd May - 2025**

**Malta,** **MT**

Agenda Item: 13.2

Source: China Telecom

Title: Summary of offline discussion on MobilityEnh\_LTM

Document for: Approval

# Introductions

**CB: # MobilityEhn\_LTM**

**- 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 - CT)

Summary of offline in [R3-253786](file:///C:\My%20PC-E\01-3GPP相关\RAN3\01-RAN3-提案\RAN3%23128%2025-05-19%20马耳他\offline%20related\Inbox\R3-253786.zip)

# For the Chairman’s Notes

Propose the following:

TP for TS38.300, R3-253136 rev [in R3-25xxxx] @ Nokia

TP for TS38.423, R3-253483 rev [in R3-25xxxx] @ Ericsson

TP for TS38.473, R3-253599 rev [in R3-25xxxx] @ Huawei

TP for TS38.401, R3-253365 rev [in R3-25xxxx] @China Telecom

Propose to capture the following:

Update the online agreement to: CU can request Candidate DU to provide CSI-RS configuration in UE CONTEXT SETUP REQUEST and UE CONTEXT MODIFICATION REQUEST message, and Candidate DU signals the CSI-RS configuration in UE CONTEXT SETUP RESPONSE and UE CONTEXT MODIFICATION RESPONSE message.

In Xn interface, candidate gNB provides the LTM CFRA Resource Configuration of each candidate cell to source gNB for LTM cell switch command generation.

Source gNB generate the UE Based TA Measurement Configuration, and transfer it to all candidate gNB(s) via LTM configuration update message.

Include the Rel-19 set IDs of source cell and each candidate cell(s) in UE Context Modification Request message. Introduce Rel-19 set IDs into LTM Security Information IE.

FFS on the Rel-19 Set ID(s) assignment among CUs, down select from Option1 and Option2:

* Option 1: Source gNB sends the Rel-19 Set ID(s) or Rel-19 set ID range assigned to the candidate gNB in the HANDOVER REQUEST message, then candidate gNB assigns Rel-19 set ID(s) to its own candidate cells and feedback via HANDOVER REQUEST ACKNOWLEDGE message.
* Option 2: Candidate gNB provides Rel-19 set ID per candidate cell in HANDOVER REQUEST ACKNOWLEDGE message, then source gNB may update the Rel-19 set ID to ensure that the Rel-19 set IDs under different candidate gNB-CU are different.

FFS on the procedure to be used for source gNB to transfer Rel-19 set ID per candidate cell to the candidate gNB.

Check the below open issues and proposals in tomorrow offline and list some key open issues if possible:

FFS on whether gNB-DU/gNB provides the resource type (periodic or semi-persistent) of the CSI-RS resources in both F1AP and XnAP.

Whether TCI State/QCL-info List needs to be included in CSI-RS COORDINATION procedure.

Proposal 1: In LTM preparation phase, the source gNB-CU obtains the candidate cell’s SP CSI-RS and SSB mapping in the HANDOVER REQUEST ACKKNOLEDGE message and send the mapping information to the source gNB-DU via the UE Context Modification Request message.

Proposal 2-1: Reuse the configuration procedure of CSI-RS resource for L1 RSRP measurement in F1AP and XnAP, add a new IE to request the CSI-RS resource for CSI acquisition and a new IE for CSI-RS resource configuration for CSI acquisition.

# Discussion

During the online session, we reached following agreement and open issues:

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| WA: RAN3 agrees that, for both F1AP and XnAP, the activation and deactivation of CSI-RS transmission in LTM candidate cells are performed at the level of individual CSI-RS Resource IDs.  Add description in Stage 2 TS 38.401 for describing that CU can request Candidate DU to provide CSI-RS configuration in UE CONTEXT SETUP REQUEST message, and Candidate DU signals the CSI-RS configuration in UE CONTEXT SETUP RESPONSE message.  For Inter-CU LTM, LTM CONFIGURATION UPDATE procedure is per node level basis with a list of cells, and security key is per cell.  Remove Note in TS 38.300 BL CR “Editor’s Note: step 6 and 7 are optional.”  Update the TA INFORMATION TRANSFER message to provide a list of TA values of multiple candidate cells. |

In this offline, we plan to continue the discussion towards inter-CU LTM procedures and prepare TPs based on the agreements we reached. In addition, we need to list some open issues for the next meeting.

## CSI-RS related issues

**Issue 1: CSI-RS Configuration for L1 measurement**

During the online session, we discuss the CSI-RS configuration procedure over F1AP based on Nokia’s proposal, companies recognize the necessity of this proposal, however the interaction of CSI-RS configuration is not only impact stage-2 spec, but also stage-3 spec, therefore, some rewording of the below agreement is needed:

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| Add description in Stage 2 TS 38.401 for describing that CU can request Candidate DU to provide CSI-RS configuration in UE CONTEXT SETUP REQUEST message, and Candidate DU signals the CSI-RS configuration in UE CONTEXT SETUP RESPONSE message. |

In addition, according to R3-253599 [HW], the UE Context Modification procedures should be reused to enable the gNB-CU to request CSI-RS resource from the (source) gNB-DU (i.e. for subsequent LTM). And when a candidate gNB-DU/gNB provides CSI-RS resources, it should indicate the resource type (periodic or semi-persistent) of the CSI-RS resources in both F1AP and XnAP. Similar proposal in R3-253468 [CATT].

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| *Proposal 5: To update UE Context Setup and UE Context Modification procedures to enable the gNB-CU request CSI-RS resource from the gNB-DU.*  *Proposal 7: When a candidate gNB-DU/gNB provides CSI-RS resources, it indicates the resource type (periodic or semi-persistent) of the CSI-RS resources in both F1AP and XnAP.* |

In this section, we can discuss how to update the agreement to give guidance on both stage-2 and stage-3 spec updates.

**Moderator summary:**

Update the online agreement to: CU can request Candidate DU to provide CSI-RS configuration in UE CONTEXT SETUP REQUEST and UE CONTEXT MODIFICATION REQUEST message, and Candidate DU signals the CSI-RS configuration in UE CONTEXT SETUP RESPONSE and UE CONTEXT MODIFICATION RESPONSE message.

FFS on whether gNB-DU/gNB provides the resource type (periodic or semi-persistent) of the CSI-RS resources in both F1AP and XnAP.

In addition, according to R3-253599 [HW], during LTM preparation phase, the source gNB-CU needs obtain the candidate cell’s SP CSI-RS and SSB mapping in the HANDOVER REQUEST ACKKNOLEDGE message and send the mapping information to the source gNB-DU via the UE Context Modification Request message, which can help source gNB/gNB-DU to select suitable SP CSI-RS resource.

Here, we can check whether the below proposal is aggregable:

**Proposal 1: In LTM preparation phase, the source gNB-CU obtains the candidate cell’s SP CSI-RS and SSB mapping in the HANDOVER REQUEST ACKKNOLEDGE message and send the mapping information to the source gNB-DU via the UE Context Modification Request message.**

**Moderator summary:**

Check this issue in tomorrow offline.

**Issue2: CSI-RS for CSI acquisition:**

Based on RAN1 incoming LS on the support of semi-persistent CSI-RS resource for LTM CSI acquisition for candidate cells, RAN3 needs to evaluate the corresponding spec impacts:

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| Similarly to the semi-persistent CSI-RS resource supported for candidate cell L1-RSRP measurement for gNB scheduled reporting, RAN1 has also agreed to introduce semi-persistent CSI-RS resource for the purpose of CSI acquisition.  Agreement  For candidate cell CSI acquisition   * In addition to periodic CSI-RS resource, semi-persistent CSI-RS resource is supported   + Support of semi-persistent CSI-RS resource is subject to separate UE capability. * MAC CE is used to activate/deactivate the semi-persistent CSI-RS resource similarly to the legacy mechanism for a serving cell which will be specified in RAN2   As captured in the agreement, RAN1 sees the spec impact in RAN2 to define the MAC CE. Also, RAN1 foresees the RAN3 spec impact to enable this functionality for inter-DU/inter-CU case. |

According to companies’ contributions, there are few companies propose to introduce a new indicator in corresponding F1AP (UE context setup, UE context modification) and XnAP (Handover Request) message for CSI-RS resource for CSI acquisition configuration [CATT, QC, Lenovo, CT, HW (F1AP)].

**Proposal 2-1: Reuse the configuration procedure of CSI-RS resource for L1 RSRP measurement in F1AP and XnAP, add a new IE to request the CSI-RS resource for CSI acquisition and a new IE for CSI-RS resource configuration for CSI acquisition.**

**Moderator summary:**

Check this issue in tomorrow offline.

For activation/deactivation of SP CSI-RS resource for CSI acquisition, it is straightforward to reuse the new introduced CSI-RS coordination procedure in F1AP and XnAP.

**Proposal 2-2: Reuse the new introduced CSI-RS coordination procedure over F1AP and XnAP for source gNB/gNB-DU to activate or deactivate the CSI-RS resource for CSI acquisition in candidate cell.**

**Moderator summary:**

Reuse the CSI-RS coordination procedure over F1AP and XnAP for source gNB/gNB-DU to activate or deactivate the SP CSI-RS resource for CSI acquisition in candidate cell.

**Issue3: Granularity of CSI-RS resource:**

During the online session, we have a brief discussion on the granularity of CSI-RS resource/resource set and reached the working assumption as below:

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| WA: RAN3 agrees that, for both F1AP and XnAP, the activation and deactivation of CSI-RS transmission in LTM candidate cells are performed at the level of individual CSI-RS Resource IDs.  For both F1AP and XnAP, the activation of CSI-RS transmission in LTM candidate cells are performed at the level of individual CSI-RS Resource IDs.  E///, Google, Nokia, HW, QC, LG-E, NTT, Jio, Samsung: individual CSI-RS Resource IDs.  ZTE, Lenovo, NEC: another option is Resource set ID.  Offline discussion on configurate CG and PRACH resources for RACH-less LTM. |

In this section, we can further check if any rewording is needed and whether we can change the WA into agreement.

**Moderator summary:**

Keep this WA and check with RAN2 progress.

In addition, we discussed what information should be included in the CSI-RS COORDINATION procedure in F1AP and XnAP, the minutes is cited as below:

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| The F1AP DU-CU CSI-RS COORDINATION REQUEST and CU-DU CSI-RS COORDINATION REQUEST messages include a list containing: NR-CGI, SP CSI-RS transmission request (activate/deactivate), CSI-RS Resources ID List, and TCI State/QCL-info List. Similar discussion on XnAP. |

During the online discussion, companies think it is feasible to include the NR-CGI, SP CSI-RS transmission request (activate/deactivate) [FFS on the details stage-3 design], but for TCI State/QCL-info List, companies still have concerns on the feasibility. In this section, we can further check the detailed information to be included, and turn the concern part into agreement if feasible.

**Moderator summary:**

Whether TCI State/QCL-info List needs to be included in CSI-RS COORDINATION procedure.

## Early RACH related issues

**Issue 1: CFRA Resource Configuration**

According to R3-253249[ZTE], in F1 interface of legacy inter-DU LTM, candidate DU will generate the CFRA resource for source DU to construct LTM cell switch command MAC CE, as shown in below:

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| If the *LTM CFRA Resource Config List* IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the gNB-DU shall, if supported, use it for the LTM cell switch command as specified in TS 38.321 [16]. |

However, corresponding signaling is still missing in Inter-DU LTM scenario. Therefore, it is suggested to also introduce the CFRA resource in Xn interface.

**Proposal: In Xn interface, candidate gNB provides the LTM CFRA Resource Configuration of each candidate cell to source gNB for LTM cell switch command generation.**

In this section, we can check whether above proposal is agreeable.

**Moderator summary:**

In Xn interface, candidate gNB provides the LTM CFRA Resource Configuration of each candidate cell to source gNB for LTM cell switch command generation.

**Issue 2: UE Based TA Measurement Configuration**

At RAN2#129bis meeting, RAN2 agreed that the UE-based TA measurement is also applicable for inter-CU LTM scenario.

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| * From RAN2 point of view, UE-based TA measurement can be also applicable for the synchronized inter-CU LTM scenario, and no additional RAN2 specification impact is expected. Final decision is up to RAN4. |

According to R3-253468 [CATT] and R3-253325 [Lenovo], on support of the UE-based TA measurement, the mechanism defined in the Rel-18 can be reused over the F1 interface. For XnAP, the source gNB should generate the UE-Based TA Measurement Configuration for each candidate cell and transfer this configuration to each candidate gNB via LTM configuration update message.

**Proposal: Source CU generate the UE Based TA Measurement Configuration, and transfer it to all candidate gNB(s) via** **LTM configuration update message.**

In this section, we can check whether above proposal is agreeable.

**Moderator summary:**

Source gNB generate the UE Based TA Measurement Configuration, and transfer it to all candidate gNB(s) via LTM configuration update message.

## Security key handling

According to the incoming LS [R3-253009] on RAN2 agreements for security key handling in inter-CU LTM:

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| Regarding the security key handling in Rel-19 Inter-CU LTM, RAN2 made the following agreements at RAN2#129bis meeting:   |  | | --- | | Agreements:   1. For security key update in inter-CU LTM, RAN2 agree to include actual NCC value in the LTM cell switch command MAC CE. 2. NCC is included in the LTM cell switch command MAC CE if the R19 set ID is different between the target cell and source cell. Conversely, if the R19 set ID is same for both cells, the NCC will not be included. 3. NW configures the corresponding sk-Counter in all LTM candidate configurations, and UE uses the configured value for generating the SN key when security key update is performed in MCG. 4. A list of sk-counters is linked to a Rel-19 set ID configured by the SN. 5. At RLF and reconfiguration with sync failure: 6. If RLF:  * If the selected candidate cell has the same Rel-19 set ID as source (no security key change), the UE performs fast failure recovery (same as in Rel-18).  1. If reconfiguration failure (inter-CU LTM):  * If the selected candidate cell has the same Rel-19 set ID as target, the UE performs fast failure recovery. FFS if fast failure recovery with different Rel-19 set IDs is allowed.  1. The indication on whether to allow or not the SN to configure an inter-SN candidate is included in the inter-node RRC message. |   The term “R19 set ID” refers to the “LTM no security change ID” configured to the UE for serving cell and candidate cells separately. RAN2 assumes that even for intra-CU LTM, the network is allowed to configure different R19 set IDs for different cells (including serving and/or intra-CU candidate cells) if the network wants to trigger security key update. From UE perspective, security key update is performed when the R19 set IDs are different between the serving cell and the target cell, whether it is intra-CU or inter-CU LTM can be transparent to the UE. |

RAN3 needs to discuss how to configure the Rel-19 set ID of each candidate cell and evaluate the spec impact.

In the last meeting, we left an open issue on **Whether to define additional information from CU to DU to deliver NCC value**, and based on companies’ contribution in this meeting, majority companies the source DU needs the Rel-19 Set ID(s) as the assistance information when trigger the LTM Cell Switch Command MAC CE to the UE (to decide whether to include the NCC value in the MAC CE), therefore, the source CU needs to sends the Rel-19 Set ID per candidate cell via UE Context Modification Request message [NEC, ZTE, Lenovo, CATT, HW, LGE, CMCC, Samsung].

**Proposal: Include the Rel-19 set ID per candidate cell in UE Context Modification Request message.**

For the stage-3 IE design, there are following options proposed by companies:

* ***Option 1****: Introduce Rel-19 set IDs into LTM Configuration ID Mapping List IE: DOCOMO, CT. CATT*
* ***Option 2****: Introduce Rel-19 set IDs into LTM Security Information IE: LGE, NEC*
* ***Option 3:*** *Introduce a new IE in UE Context Modification Request message: HW*

In this section, we can check if the proposal is agreeable and down select from the potential options for stage-3 design.

**Moderator summary:**

Include the Rel-19 set IDs of source cell and each candidate cell(s) in UE Context Modification Request message. Introduce Rel-19 set IDs into LTM Security Information IE.

For the Rel-19 Set ID assignment among CUs, there are following options proposed by companies:

* ***Option 1****: Source gNB sends the Rel-19 Set ID(s) or Rel-19 set ID range assigned to the candidate gNB in the HANDOVER REQUEST message, then candidate gNB assigns Rel-19 set ID(s) to its own candidate cells and feedback via HANDOVER REQUEST ACKNOWLEDGE message: LGE, Ericsson(?), Lenovo, QC, Nokia, Google*
* ***Option 2****: Candidate gNB provides Rel-19 set ID per candidate cell in HANDOVER REQUEST ACKNOWLEDGE message, then source gNB may update the Rel-19 set ID to ensure that the Rel-19 set IDs under different candidate gNB-CU are different: CT, CATT, ZTE, HW (provide the list of candidate cells that needs security key change)*

Besides, companies think it is feasible for source gNB to send Rel-19 set ID per candidate cell to the candidate gNB via XnAP (i.e. as sync-up information for subsequent LTM), the candidate procedure to be used is listed as below:

* + ***Option 1****: Via Cell Switch Notification message: ZTE, LGE*
  + ***Option 2:*** *Via LTM Configuration Update message: CT, Lenovo, CATT, Ericsson*
  + ***Option 3:*** *Via both message: LGE*

In this section, we can discuss the solution for Rel-19 Set IDs assignment among CUs based on the above options.

**Moderator summary:**

FFS on the Rel-19 Set ID(s) assignment among CUs, down select from Option1 and Option2:

* Option 1: Source gNB sends the Rel-19 Set ID(s) or Rel-19 set ID range assigned to the candidate gNB in the HANDOVER REQUEST message, then candidate gNB assigns Rel-19 set ID(s) to its own candidate cells and feedback via HANDOVER REQUEST ACKNOWLEDGE message.
* Option 2: Candidate gNB provides Rel-19 set ID per candidate cell in HANDOVER REQUEST ACKNOWLEDGE message, then source gNB may update the Rel-19 set ID to ensure that the Rel-19 set IDs under different candidate gNB-CU are different.

FFS on the procedure to be used for source gNB to transfer Rel-19 set ID per candidate cell to the candidate gNB.

## Reference configuration

In RAN3#127 meeting, we reached following agreements and left an open issue for reference configuration for inter-CU LTM case:

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| *The source gNB can generate reference configuration and provide a reference configuration for LTM in a Handover Request and LTM configuration update message.*  *The candidate gNB indicates whether a LTM candidate configuration is a complete candidate configuration in the Handover Request Acknowledge and LTM configuration update acknowledge message.*  *FFS on whether the source gNB* *can request a candidate gNB to provide a reference configuration.* |

Based on companies’ contributions, companies’ preference on whether source gNB can request a candidate gNB to provide a reference configuration is listed as below:

* + *Support: Nokia, NEC, Lenovo, CATT, DOCOMO, CT, CMCC, Samsung, Google*
  + *Not support: Ericsson, QC, LGE*

Since we have struck in this issue for several meeting, if no new evidence is provided for this issue, moderator propose to skip this issue and leave it as an open issue for the next meeting.

**Open issues for the next meeting: FFS on whether the source gNB can request a candidate gNB to provide a reference configuration.**

**Moderator summary:**

Not treated, leave this issue as open issue for the next meeting.

## TA Information Transfer

In the last RAN3 meeting, we agreed to introduce a new non-UE associated class-2 TA information Transfer message to transfer the TA information from the candidate gNB-CU to the source gNB-CU. But left an open issue on **whether to include the XnAP IDs** in this new message.

Regarding to what information should be included in the TA Information Transfer message, companies have following proposals:

* + ***Not include the XnAP IDs****: Nokia, ZTE, CATT, QC, DOCOMO, CMCC, Samsung*
  + ***Include the XnAP IDs****: Ericsson*
  + ***Include Tag ID Pointer****: NEC, CATT, CT*
  + ***Include source gNB-DU ID/RACH resource request ID****: NEC, QC, DOCOMO, Samsung*

In addition, similar as intra-CU LTM, there are companies propose the include the TA values in Cell Switch Notification message for subsequent LTM, while some companies think it is not needed:

* + ***Include the TA values in Cell Switch Notification message****: Samsung, Nokia, QC*
    - *In addition to TA values, also include the measured RSRP: Nokia*
    - *Include TA validity timer values associated with the TA values: QC*
  + ***Do not include the TA values in Cell Switch Notification message****: CATT, CT*

In this section, we can further check if we can reach some consensus on the above issues.

**Moderator summary:**

Not treated.

## Handling of multiple UE associations

For subsequent LTM, the UE association need to be setup between the new serving gNB and the candidate gNB after each LTM cell switch, when establishing the UE association, the candidate gNB should identify that the UE is the same as the previously associated between the old serving gNB and the current candidate gNB. In the last RAN3 meeting, we agreed to use the old target UE XnAP ID to identify the UE context, but how to deliver the old target UE XnAP ID(s) to the new serving gNB is still FFS.

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| *For subsequent LTM, the candidate gNB uses the old target UE XnAP ID (the target UE AP ID it previously allocated between it and the old serving gNB) to identify the UE context when receiving the LTM Configuration Update message from the new serving gNB. FFS on how to deliver the old target UE XnAP ID(s) to the new serving gNB.* |

Regarding to how to deliver the old target UE XnAP ID(s) to the new serving gNB, based on companies’ proposals, there are following options to deliver the old target UE XnAP ID(s) to the new serving gNB:

* + ***Option 1:*** *The source gNB transfers the old target UE XnAP ID for each candidate gNB to the new source gNB via the* ***LTM Configuration Update*** *procedure: NEC (after HO success), Lenovo, CATT, CT, LGE (after HO success), CMCC, Samsung*
  + ***Option 2****: The source gNB sends the old target UE XnAP IDs for each candidate gNB to the new source gNB via* ***Cell Switch Notification message****: HW, QC, LGE*

Besides, in R3-253599 [Huawei], it proposed to clarify that the “old target UE XnAP ID” is the target UE XnAP ID allocated by the candidate gNB after last LTM cell switch e.g., when receiving the LTM Configuration Update Request message from the new source gNB.

In R3-253482 [Ericsson], it proposed to include the old source NG-RAN node UE XnAP ID, old target NG-RAN node UE XnAP ID, old source NG-RAN ID, old target NG-RAN node ID in LTM CONFIGURATION UPDATE message to allow the new candidate gNB to identify the same UE.

In this section, we can further check if we can reach some consensus on the above issue.

**Moderator summary:**

Not treated.

## Open issues for the next meeting

In this session, we can list some open issues for the next meeting, companies are encouraged to focus on the key issues.

List the key open issues in tomorrow offline.

## TP/BLCRs

Prepare following TPs based the agreements in this meeting:

TP for 38.300 Nokia

TP for 38.423 Ericsson

TP for 38.473 Huawei

TP for 38.401 China Telecom

# Conclusion, Recommendations [if needed]

If needed

# References

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

# Appendix

**Previous meeting agreements:**

*RAN3#123bis:*

*Prioritize to support inter-CU LTM over Xn interface, and RAN3 specify the inter-CU LTM solutions for standalone scenario first.*

*Reuse existing Xn Handover Request and Handover Request ACK for Inter-CU LTM initial preparation.*

*Confirm the case that inter-CU LTM is not configured in both MCG and SCG at the same time.*

*Early data forwarding can be supported for inter-CU LTM.*

*Cell Switch Notification from source DU to target DU (in different gNB from source) for LTM execution.*

*RAN3#124:*

*Source gNB-CU initiates the handover preparation procedure for inter-gNB-CU LTM.*

*Introduce a new procedure on Xn to transfer the TA information.*

*A new XnAP class 2 procedure, namely LTM Cell Switch Notification is introduced on Xn to forward the target Cell ID and target TCI state ID(s) from the source gNB-CU to the target gNB-CU.*

*Reuse Handover Success procedure over Xn for Rel-19 Inter-CU LTM, to tell the source CU that the UE has accessed to the target Cell.*

*The Handover Cancel message is reused by the source gNB to release the reserved resource for LTM candidate cells in the candidate gNBs.*

*Early data forwarding can be triggered before the Source gNB triggers a MAC CE Command to the UE to change cells, timing is left to implementation.*

*Early sync configuration (TCI state and RACH configuration) can be obtained during the LTM preparation phase through the handover request and handover request acknowledge messages.*

*A candidate gNB can initiate cancellation of configured LTM candidate cell(s) of its own. Details are FFS.*

*FFS on the LTM modification procedures.*

*FFS on whether to reuse the existing XnAP UE CONTEXT RELEASE message at the source gNB if no LTM candidate cell(s) exist in the source gNB.*

*RAN3#125:*

*Introduce a new UE associated Class-1 XnAP procedure to update the LTM configurations for subsequent LTM.*

*Change the name of LTM Cell Switch Notification message to Cell Switch Notification message.*

*Reuse the Early Status Transfer and SN Status Transfer message for inter-CU LTM.*

*Adopt Class-2 procedure for candidate gNB-initiated LTM cancellation. Down select from Option1 and Option3 in the next meeting:*

*Option 1: Reuse CHO Cancel*

*Option 2: Rename CHO Cancel*

*Option 3: Introduce new procedure*

*RAN3#125bis:*

*Current SSB information in Xn Setup and Configuration Update procedures can be reused for LTM preparation phase.*

*WA: For inter-CU LTM mobility, a separate LTM request message (i.e. HANDOVER REQUEST message) is used for each candidate cell.*

*The error handling of multiple UE associations need to be considered.*

*The LTM Configuration IDs are allocated by the source CU.*

*WA: Reuse the existing XnAP UE CONTEXT RELEASE message at the source gNB if no LTM candidate cell(s) exist in the source gNB.*

*Follow F1AP, the source gNB-CU sends the CSI resource configuration of candidate cells to candidate gNB-CUs via Handover Request message for subsequent LTM, and the candidate gNB-CU sends the CSI report configuration to the source gNB-CU via Handover Request ACK message.*

*How the source gNB-CU sends the reference configuration to all candidate gNBs is pending on RAN2 progress.*

*Confirm the name of the new procedure as “LTM Configuration Update”.*

*Introduce a new procedure for candidate gNB-initiated LTM cancellation.*

*Allow UE association in-between candidate CUs (in case the Xn connectivity existed) for subsequent LTM. When and how to establish the UE association is FFS.*

*RAN3#126:*

*RAN3 move forward on Legacy framework with PDCP change/switch for inter-CU LTM in this release, not considering the PDCP anchor based solution.*

*The source CU can request candidate CU to provide CSI-RS configuration in HANDOVER REQUEST message, and candidate CU signals the CSI-RS configuration in HANDOVER REQUEST ACKNOWLEDGEMENT message.*

*The source CU generates common CSI-RS Resource Configuration and sends it to candidate CU in LTM CONFIGURATION UPDATE message, the candidate CU signals the CSI-RS Report Configuration in LTM CONFIGURATION UPDATE ACKNOWLEDGEMENT message.*

*Turn the WA into agreement: For inter-CU LTM mobility, a separate LTM request message (i.e. HANDOVER REQUEST message) is used for each candidate cell.*

*To support subsequent LTM, the LTM Configuration Update procedure is reused to establish UE association between the new source gNB and the other candidate gNB(s) after each inter-CU LTM Cell Switch.*

*Confirm the message name as LTM Cancel for candidate gNB-initiated LTM cancellation.*

*Turn the WA into agreement: Reuse the existing XnAP UE CONTEXT RELEASE message at the source gNB if no LTM candidate cell(s) exists in the source gNB.*

*Late data forwarding may be initiated after the source gNB decides to trigger the LTM Cell Switch Command to the UE, when exactly it is initiated is left to implementation?*

*RAN3#127:*

*For both inter-CU and intra-CU cases:*

*For the network Semi-Persistent CSI-RS coordination, source gNB-DU/source gNB triggers the activation/deactivation of the CSI-RS transmission in the candidate cell.*

*For the activation/deactivation procedure, a class 1 procedure is needed from the source gNB-DU/source gNB. FFS for reusing existing one or a new one.*

*The candidate gNB-CU responds the full SSB Time/Frequency Configuration (in SSB Information IE) of candidate cells to the source gNB-CU in the Handover Request ACK message.*

*The source gNB-CU sends the pair of (gNB ID, new ID of early RACH configuration resource (to be further discussed)) to the candidate gNB-CU to request early RACH configuration.*

*WA: Introduce a new non-UE associated class 2 procedure on Xn, namely TA information Transfer message, to transfer the TA information from the candidate gNB-CU to the source gNB-CU.*

*RAN3 agree the following scenarios to support LTM with NR-DC:*

*1.SN initiated inter-CU SCG LTM without MCG changes (high priority)*

*2.Inter-CU MCG LTM without SN release*

*3.Inter-CU MCG LTM with SN release*

*4.Inter-CU MCG LTM with SN addition*

*The format of the new introduced IE is same with the gNB-DU ID.*

*The source gNB can generate reference configuration and provide a reference configuration for LTM in a Handover Request and LTM configuration update message.*

*The candidate gNB indicates whether a LTM candidate configuration is a complete candidate configuration in the Handover Request Acknowledge and LTM configuration update acknowledge message.*

*FFS on whether the source gNB can request a candidate gNB to provide a reference configuration.*

*WA: Use a single UE association for multiple LTM handover request to the same candidate gNB.*

*Reuse the LTM Configuration Update procedure to sync up configurations among candidate gNBs for subsequent LTM, including early sync configuration, configuration ID, and data forwarding addresses, etc.*

*It is up to the network implementation when the sync up is performed: during the preparation step, or during the cell switch execution step, or after successful cell switch.*

*Normal data forwarding may be initiated after the source gNB decides to trigger the LTM cell switch for the UE, and when exactly it is initiated is left to implementation.*

*For SN initiated inter-CU SCG LTM, the source SN initiates the inter-CU SCG LTM preparation procedure by sending an SN Change Required message to the MN.*

*The MN requests each candidate SN to allocate resources for the UE via SN Addition request message.*

*Within the list of cells suggested by the source SN, the candidate SN provides the SCG part configuration of each candidate PSCell and may also provide the L1 RS (e.g. a list of SSB or a list of CSI-RS) configuration for L1 measurement, early UL sync configuration or TCI-state configuration, to the MN, via SN addition request ACK message.*

*In order to support subsequent inter-CU SCG LTM, the MN needs to transfer the common CSI resource configuration and the collected information of candidate cells to the candidate SN(s), via SN modification request message. Accordingly, the candidate SN(s) responds with the updated candidate SCG configuration to the MN via SN modification request ACK message.*

*The Cell Switch Notification message can be reused from the source SN to the target SN via the MN. The detailed IE can be further discussed.*

*RAN3#127bis:*

*Reuse the LTM configuration update procedure to transfer UE’s 5G security capabilities and/or UE’s UP security policy from the new serving gNB to the other candidate gNBs in subsequent LTM.*

*The new NCC value needs to be sent from gNB-CU to the gNB-DU via UE context modification procedure.*

*Introduce two new Class-1 UE-associated procedures over F1AP to support the source gNB-DU to trigger the activation/deactivation of the SP CSI-RS transmission in the candidate cell(s).*

*Introduce a new class-1 UE-associated procedures over XnAP for the SP CSI-RS activation/deactivation.*

*Open issues on the granularity of the CSI-RS resource/resource set, and need to be checked with RAN2 progress.*

*For the initial inter-CU LTM preparation, the source gNB computes the KgNB\*(s) (per candidate cell) for the candidate gNB, and forwards the {KgNB\*, NCC} pair(s) to the candidate gNB via a Handover Request message as legacy.*

*The new source gNB needs to provide the new KgNB\*(s) to the corresponding candidate gNB via a LTM configuration update procedure. FFS on the procedure design either per cell or per gNB.*

*Whether to define additional information from CU to DU to deliver NCC value.*

*Turn the WA into agreement: Introduce a new non-UE associated class 2 procedure on Xn, namely TA information Transfer message, to transfer the TA information from the candidate gNB-CU to the source gNB-CU.*

*Include the following information in the TA information transfer message:*

*Candidate Cell ID*

*TA value*

*Preamble index*

*RA-RNTI*

*FFS on the XnAP IDs.*

*Turn the WA into agreement: Use a single UE association (e.g. identified by a pair of {Source NG-RAN node UE XnAP ID IE and Target NG-RAN node UE XnAP ID IE}) for multiple LTM handover request to the same candidate gNB.*

*For subsequent LTM, the candidate gNB uses the old target UE XnAP ID (the target UE AP ID it previously allocated between it and the old serving gNB) to identify the UE context when receiving the LTM Configuration Update message from the new serving gNB. FFS on how to deliver the old target UE XnAP ID(s) to the new serving gNB.*

*Data Forwarding Information IE is a list including multiple data forwarding addresses from each candidate gNB(s).*