3GPP TSG-RAN WG3 Meeting #128 R3-253910

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**Title:** (TP for 38.401) Conditional intra-gNB-CU LTM

**Source:** ZTE Corporation, Nokia, LG Electronics, NEC, China Telecom, Ericsson, CATT, Huawei, Samsung, NEC, China Telecom, Google, Ofinno

Agenda item: 13.3

**Document for:** Discussion and Decision

# Introduction

This TP is for intra-CU conditional LTM.

# TP for LTM BLCR for TS38.401

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8.2.1.x Conditional intra-CU LTM (Intra-gNB-DU)

This procedure is used for the case when the UE moves within the same gNB-DU during NR operation for conditional LTM. Figure 8.2.1.x-1 shows the intra-gNB-DU conditional LTM procedure for intra-NR.



**Figure 8.2.1.x-1: Conditional intra-CU LTM (Intra-gNB-DU)**

1. The UE sends a *MeasurementReport* message (L3 measurement result) to the gNB-DU containing measurements of neighbouring cells. The gNB-DU sends an UL RRC MESSAGE TRANSFER message conveying the received *MeasurementReport* message to the gNB-CU.

2. The gNB-CU determines to initiate conditional LTM configuration.

3. The gNB-CU sends a UE CONTEXT MODIFICATION REQUEST message to the gNB-DU for each candidate cell, containing conditional LTM indication, one candidate cell ID and the CSI resource configuration for subsequent LTM. The gNB-CU may provide the LTM configuration ID mapping list to the gNB-DU. The gNB-CU may request PRACH resources from the gNB-DU. The gNB-CU may request the gNB-DU to provide the lower layer configuration for the purpose of generating the reference configuration or provide the lower layer reference configuration to the gNB-DU. The gNB-CU may inform the gNB-DU about intra-DU L2 reset configuration. If the gNB-CU decides to initiate the L1 event-triggered conditional LTM, it also provides a list of candidate cells to which the L1 event-triggered conditional LTM is applied and requests the gNB-DU to generate the corresponding L1-based execution condition(s).

4. If the gNB-DU accepts the request of LTM configuration, it responds with a UE CONTEXT MODIFICATION RESPONSE message including the generated lower layer RRC configurations for the accepted candidate cell. If the L1-based execution conditions are requested, the gNB-DU also provides a list of execution conditions generated for other candidate cells (detail FFS).

NOTE 1: Steps 3 and 4 may be initiated multiple times for conditional LTM candidate cell preparation of multiple cells including the source cell.

5. The gNB-CU sends a UE CONTEXT MODIFICATION REQUEST message to the gNB-DU which may include the LTM configuration ID mapping list and/or the updated CSI resource configuration. The gNB-CU may inform the gNB-DU about intra-DU L2 reset configuration.

6. The gNB-DU responds with a UE CONTEXT MODIFICATION RESPONSE message which includes an updated lower layer configuration, e.g., containing the updated CSI report configuration of the source cell. If the L1-based execution conditions are requested, the source gNB-DU also provides a list of execution conditions generated for the candidate cells.

NOTE 2: In case of subsequent conditional LTM, the CU-initiated UE Context Modification procedure may be invoked per each candidate cell to transfer to the gNB-DU the updated CSI resource configuration.

7. The gNB-CU sends a DL RRC MESSAGE TRANSFER message to the gNB-DU, which includes the generated *RRCReconfiguration* message with the conditional LTM configuration.

8. The gNB-DU forwards the received *RRCReconfiguration* message to the UE.

9. The UE responds to the gNB-DU with an *RRCReconfigurationComplete* message.

10. The gNB-DU forwards the *RRCReconfigurationComplete* message to the gNB-CU via an UL RRC MESSAGE TRANSFER message.

11. Early TA acquisition to the candidate cell(s) may be performed as specified in TS 38.300 [2].

12. The gNB-DU sends the MAC CE to the UE.

13. The execution condition(s) to trigger initiation of conditional LTM is fulfilled in the UE.

NOTE 3: The gNB-DU may decide to trigger an LTM Cell Switch Command MAC CE to the UE towards a candidate cell with conditional LTM candidate configuration.

14. The gNB-DU detects the UE access as specified in TS 38.300 [2].

15. The gNB-DU sends an ACCESS SUCCESS message to inform the gNB-CU of which cell the UE has successfully accessed. The gNB-DU also sends a Downlink Data Delivery Status frame to inform the gNB-CU about the unsuccessfully transmitted downlink data to the UE. Downlink packets, which may include PDCP PDUs not successfully transmitted in the source cell, are sent from the gNB-CU to the gNB-DU.

16. The UE sends an *RRCReconfigurationComplete* message to the gNB-DU.

17. The gNB-DU forwards the *RRCReconfigurationComplete* message to the gNB-CU via an UL RRC MESSAGE TRANSFER message.

18. The gNB-CU may send the UE CONTEXT MODIFICATION REQUEST message to the gNB-DU to release the resources of prepared cells.

19. The gNB-DU responds with a UE CONTEXT MODIFICATION RESPONSE message.

8.2.1.y Conditional intra-CU LTM (Inter-gNB-DU)

This procedure is used for the case when the UE moves from one gNB-DU to another gNB-DU within the same gNB-CU during NR operation for Conditional LTM. Figure 8.2.1.y-1 shows the inter-gNB-DU Conditional LTM procedure for intra-NR.



**Figure 8.2.1.y-1: Conditional intra-CU LTM (Inter-gNB-DU)**

1. The UE sends a *MeasurementReport* message (L3 measurement result) to the source gNB-DU containing measurements of neighbouring cells. The source gNB-DU sends an UL RRC MESSAGE TRANSFER message conveying the received *MeasurementReport* message to the gNB-CU.

2. The gNB-CU determines to initiate conditional LTM configuration.

3. The gNB-CU sends a UE CONTEXT SETUP REQUEST message to the candidate gNB-DU(s) for each candidate cell, containing conditional LTM indication, one candidate cell ID and the CSI resource configuration for subsequent conditional LTM. The gNB-CU may provide the LTM configuration ID mapping list to the candidate gNB-DU(s). The gNB-CU may request PRACH resources from the candidate gNB-DU(s). The gNB-CU may request the candidate gNB-DU(s) to provide the lower layer configuration for the purpose of generating the reference configuration or provide the lower layer part of the reference configuration to the candidate gNB-DU(s). If the gNB-CU decides to initiate the L1 event-triggered conditional LTM, it also provides a list of candidate cells to which the L1 event-triggered conditional LTM is applied and requests the gNB-DU to generate the corresponding L1-based execution condition(s).

4. If the candidate gNB-DU accepts the request of LTM configuration, it responds with a UE CONTEXT SETUP RESPONSE message including the generated lower layer RRC configurations for the accepted target candidate cell. If the L1-based execution conditions are requested, the candidate gNB-DU also provides a list of execution conditions and a list of TA timers generated for other candidate cells.

NOTE 1: The CU-initiated UE Context Modification procedure may be initiated for preparing candidate cells in the source gNB-DU as specified in step 3 and 4 in 8.2.1.4 Intra-gNB-DU conditional LTM.

5. The gNB-CU sends a UE CONTEXT MODIFICATION REQUEST message to the source gNB-DU including the information related to early sync and the LTM configuration ID mapping list for the accepted target candidate cell(s). The gNB-CU may send the updated CSI resource configuration to the source gNB-DU. The gNB-CU may inform the source gNB-DU about intra-DU L2 reset configuration.

6. The source gNB-DU responds with a UE CONTEXT MODIFICATION RESPONSE message which includes an updated lower layer configuration, e.g., containing the updated CSI report configuration of the source cell. If the L1-based execution conditions are requested, the source gNB-DU also provides a list of execution conditions generated for the candidate cells.

7. The gNB-CU may send a UE CONTEXT MODIFICATION REQUEST message for each candidate cell accepted in the candidate gNB-DU(s), containing the information for subsequent conditional LTM or for updating the configurations of candidate cells. The gNB-CU may also provide the lower layer part of the reference configuration to the candidate gNB-DU(s). The gNB-CU may inform the candidate gNB-DU(s) about intra-DU L2 reset configuration.

8. The candidate gNB-DU responds with a UE CONTEXT MODIFICATION RESPONSE message including the updated lower layer configuration, e.g., containing the updated CSI report configuration of the requested candidate cell. If the L1-based execution conditions are requested, the candidate gNB-DU also provides a list of execution conditions generated for other candidate cells.

NOTE 2: Step 7 may also be triggered after step 18 for subsequent conditional LTM.

9. The gNB-CU sends a DL RRC MESSAGE TRANSFER message to the source gNB-DU, which includes the generated *RRCReconfiguration* message with the conditional LTM configuration.

10. The source gNB-DU forwards the received *RRCReconfiguration* message to the UE.

11. The UE responds to the source gNB-DU with an *RRCReconfigurationComplete* message.

12. The source gNB-DU forwards the *RRCReconfigurationComplete* message to the gNB-CU via an UL RRC MESSAGE TRANSFER message.

13. Early TA acquisition to the candidate cell(s) may be performed as specified in TS 38.300 [2].

14. The candidate gNB-DU sends a DU-CU TA INFORMATION TRANSFER message to the gNB-CU, which includes the TA values, and the associated PRACH resource information.

15. The gNB-CU forwards the TA value and the associated PRACH resource information to the source gNB-DU in the CU-DU TA INFORMATION TRANSFER message.

*Editor’s Note: Details are FFS on step 14 and 15 on how to handle the TAT.*

16. The source gNB-DU sends the MAC CE to the UE.

17. The execution condition(s) to trigger initiation of conditional LTM is fulfilled in the UE.

NOTE 3: The source gNB-DU may decide to trigger a LTM Cell Switch Command MAC CE to the UE towards a candidate cell with conditional LTM candidate configuration.

18. The target gNB-DU detects the UE access as specified in TS 38.300 [2].

19. The target gNB-DU sends an ACCESS SUCCESS message to inform the gNB-CU of which cell the UE has successfully accessed. The target gNB-DU also sends a Downlink Data Delivery Status frame to inform the gNB-CU.

20. The UE sends an *RRCReconfigurationComplete* message to the target gNB-DU.

21. The target gNB-DU forwards the *RRCReconfigurationComplete* message to the gNB-CU via an UL RRC MESSAGE TRANSFER message.

22. The gNB-CU sends a UE CONTEXT MODIFICATION REQUEST message to source gNB-DU to inform that the UE executed an inter-DU Conditional LTM and indicate to stop the data transmission for the UE. The source gNB-DU sends a Downlink Data Delivery Status frame to inform the gNB-CU about the unsuccessfully transmitted downlink data to the UE. Downlink packets, which may include PDCP PDUs not successfully transmitted in the source gNB-DU, are sent from the gNB-CU to the target gNB-DU.

NOTE 4: The step 22 may happen before step 21, as soon as the gNB-CU knows which cell the UE has successfully accessed.

23. The source gNB-DU responds to the gNB-CU with a UE CONTEXT MODIFICATION RESPONSE message.

24. The gNB-CU may send the UE CONTEXT RELEASE COMMAND message to the source gNB-DU to release the resources of prepared cells.

25. The source gNB-DU responds with a UE CONTEXT RELEASE COMPLETE message.

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/