3GPP TSG RAN Meeting #109 draftRP-252114
Beijing, China, September 15-18, 2025

**Agenda Item:**  **9.6.2.1**

**Source: Rapporteur (Apple Inc, China Telecom)**

**Title: Summary for WI** **NR Mobility Enhancements Phase 4**

**WI code(s): NR\_Mob\_Ph4**

**Leading WG: TSG RAN WG2**

**Release: Rel-19**

# Introduction

This work-item is an enhancement of Rel-18 WI : Further NR Mobility Enhancements which was completed in RAN-103.

This summary provides the main functionality achieved for the 4 objectives of this WI:

1) L1/L2-based Inter-CU inter-cell mobility

2) Enhancements to measurements for LTM

3) Conditional LTM for intra-CU cases

4) RRM core requirements for inter-CU LTM and conditional LTM, and for measurement enhancements for LTM.

Corresponding stage-2 descriptions are specified in TS38.300 and TS37.340 (for NR-DC part). Physical layer procedures are specified in TS 38.312, TS 38.213, and TS 38.214. MAC and RRC signalling are specified in are specified in TS 38.321 and TS 38.331, respectively. NG-RAN architecture and protocols are specified in TS 38.401, TS 38.420, TS 38.423, TS 37.483, TS 38.470, and TS 38.473. Measurement requirements are specified in TS 38.133. UE capabilities are specified in TS 38.306.

# Description

1. Inter-CU L1/L2 based inter-cell mobility
* Enhancements to the L1/L2-triggered mobility procedure (LTM) to allow for mobility between gNB-CUs.
	+ RRC configuration addition for LTM candidates where the candidate can belong to multiple gNB-CUs.
	+ Configuration changes to allow for the provision of security context configuration (via next chaining count – NCC) via MAC CE.
	+ Necessary inter-gNB-CU signalling to generate the LTM configuration (i.e. CSI resource configuration, early sync configuration and reference configuration, etc) for candidate cells belonging to multiple gNB-CUs and support subsequent inter-CU LTM execution.
1. Measurement enhancements for LTM
* Measurement design additions to allow for using CSI-RS for LTM
	+ Specify periodic and semi-persistant CSI-RS resource configurations to enable CSI-RS based beam management on candidate cells for LTM.
	+ Specify periodic and semi-persistent CSI resource configurations and reporting mechanisms to enable early CSI acquisition on candidate cells before or during LTM cell switching.
* Design of measurement framework for LTM based on beams
	+ Addition of measurement events that get triggered based on beam measurements of source and candidate cells.
	+ Necessary framework to allow for indication to the NW about the triggered events and reporting via MAC CE, of the beam measurements based on the triggered events.
1. Conditional LTM
* Introduction of UE triggered LTM based on the evaluation of conditions that allow for such LTM
	+ Configuration of potential candidate cells for conditional LTM.
	+ Configuration of evaluation conditions that can trigger LTM from the UE
	+ Early timing advance(TA) acquisition and maintenance at the UE, for these conditional LTM candidates.
		- TA can be acquired for multiple candidates via preamble triggered by PDCCH order, or UE-based TA measurement
	+ RACH-less conditional LTM if TA value is available and valid.
	+ Necessary F1AP signalling to generate C-LTM configuration (i.e. L1 execution condition(s), etc) for candidate cells belonging to same gNB-CU, and support subsequent intra-CU C-LTM execution.
1. RRM core requirements for Inter-CU L1/L2-based mobility and CLTM enhancements
* Defined event triggered L1 RSRP measurement reporting requirements
* Defined LTM candidate cell CSI-RS based L1 RSRP measurement requirements
* Defined conditional cell switch delay and interruption requirements

# Reference

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3. R1-2504974, Introduction of NR mobility enhancements Phase 4, Samsung, May. 2025
4. R1-2504999, Introduction of specification support for NR mobility enhancements phase 4, Nokia, May. 2025
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6. R2-2506226, (37.340 CR) Introduction of NR further mobility enhancements, China Telecom Sep 2025
7. R2-2506230, (38.331 CR) Introduction of NR further mobility enhancements phase 4, Ericsson, Sep 2025
8. R2-2506229, (38.321 CR) Introduction of NR further mobility enhancements phase 4, Vivo, Sep. 2025
9. R2-2506228, (Endorsed) Draft 38.306 CR for UE capability for NR further mobility enhancements phase 4 CATT, Sep 2025
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17. R3-255059, (38.470 CR) Support for Inter-CU LTM procedure, Samsung, Huawei, LG Electronics, Ericsson, China Telecom, Nokia, ZTE Corporation, CATT, August 2025.
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