**3GPP TSG-RAN WG4 Meeting #116 R4-2509595**

**Bengaluru, IN, 25th - 29th Aug 2025**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **draftCR** | **rev** | **-** | **Current version:** | **19.1.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Draft CR to TS 38.133 on NR mobility enhancements Phase4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | China Telecom, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_Mob\_Ph4-Core | | | | |  | ***Date:*** | | | 2025-05-23 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In Rel-19 NR\_Mob\_Ph4, the mechanism of conditional LTM has been supported, the corresponding RRM requirement needs to be specified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add the RRM requirement on conditional LTM. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Corresponding RRM requirement would still be missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.3, 6.3.x (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Start of Change 1

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [11] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [11].

AoA Angle of Arrival

AoD Angle of Departure

ATG Air to Ground

AWGN Additive White Gaussian Nouse

BFD Beam Failure Detection

BFD-RS BFD Reference Signal

BLER Block Error Rate

BM-RS Beam Management Reference Signal

BW Bandwidth

BWP Bandwidth Part

CA Carrier Aggregation

CBD Candidate Beam Detection

CBW Channel Bandwidth

CC Component Carrier

CCA Clear Channel Assessment

CCE Control Channel Element

CG-SDT Configured Grant Small Data Transmission

CHO Conditional Handover

CLI Cross Link Interference

CLTM Conditional L1/L2 triggered mobility

CMR Channel Measurement Resource

CN Core Network

CORESET Control Resource Set

CP Cyclic Prefix

CPC Conditional PSCell Change

CSI Channel-State Information

CSI-RS CSI Reference Signal

CSI-RSRP CSI Reference Signal based Reference Signal Received Power

CSI-RSRQ CSI Reference Signal based Reference Signal Received Quality

CSI-SINR CSI Reference Signal based Signal to Noise and Interference Ratio

CSI\_RP Received (linear) average power of the resource elements that carry NR CSI-RS signals and channels, measured at the UE antenna connector

DAPS Dual Active Protocol Stack

DBT Discovery Burst Transmission

DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DL-AoD Downlink Angle-of-Departure

DL-TDOA Downlink Time Difference Of Arrival

DMRS Demodulation Reference Signal

DPC Delta Power Class

DRX Discontinuous Reception

E-CID Enhanced Cell ID

eDRX Extended DRX

E-UTRA Evolved UTRA

E-UTRAN Evolved UTRAN

EMR Early measurement reporting

EMW Effective measurement window

EMWRP Effective measurement window repetition period

EN-DC E-UTRA-NR Dual Connectivity

FDD Frequency Division Duplex

FH Frequency Hopping

FR Frequency Range

GEO Geostationary Earth Orbit

GNSS Global Navigation Satellite System

GSO Geosynchronous Orbit

HARQ Hybrid Automatic Repeat Request

HO Handover

HST High Speed Train

GAP Refers to any of Measurement Gap, activated Pre-MG and NCSG

IMR Interference Measurement Resource

kHz Kilo Hertz

L1-RSRP Layer 1 RSRP

L1 SL-RSRP Layer 1 Sidelink RSRP which corresponds to PSCCH-RSRP and/or PSSCH-RSRP

LEO Low Earth Orbit

LMF Location Management Function

LPP LTE Positioning Protocol

LTM L1/L2 triggered mobility

MAC Medium Access Control

MCG Master Cell Group

MDT Minimization of Drive Tests

MG Measurement Gap

MGL Measurement Gap Length

MGRP Measurement Gap Repetition Period

MHz Mega Hertz

MIB Master Information Block

ML Measurement Length

MN Master Node

MR-DC Multi-Radio Dual Connectivity

MUSIM Multi-Universal Subscriber Identity Module

NCSG Network Controlled Small Gap

NE-DC NR-E-UTRA Dual Connectivity

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NGSO Non-Geosynchronous Orbit

NR New Radio

NR-DC NR-NR Dual Connectivity

NTN Non-Terrestrial Network

OCNG OFDMA Channel Noise Generator

OFDM Orthogonal Frequency Division Multiplexing

OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel

PCC Primary Component Carrier

PCell Primary Cell

PCI Physical Cell Identity

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PLMN Public Land Mobile Network

PRACH Physical RACH

Pre-MG Pre-configured Measurement Gap

ProSe Proximity-based Service

PRB Physical Resource Block

PRP PRS Received Power

PRS Positioning Reference Signal

PRS-RSRP Positioning Reference Signal based Reference Signal Received Power

PPW PRS Processing Window

PPWL PRS Processing Window Length

PPWRP PRS Processing Window Repetition Period

PSBCH Physical Sidelink Broadcast Channel

PSBCH-RSRP Physical Sidelink Broadcast Channel DMRS based Reference Signal Received Power

PSCCH Physical Sidelink Control Channel

PSCCH-RSRP Physical Sidelink Control Channel DMRS based Reference Signal Received Power

PSCell Primary SCell

PSS Primary Synchronization Signal

PSSCH Physical Sidelink Shared Channel

PSSCH-RSRP Physical Sidelink Shared Channel DMRS based Reference Signal Received Power

pTAG Primary Timing Advance Group

PTW Paging Time Window

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

QCL Quasi Co-Location

RACH Random Access Channel

RAN Radio Access Network

RAT Radio Access Technology

RF Radio Frequency

RLM Radio Link Monitoring

RLM-RS Reference Signal for RLM

RMC Reference Measurement Channel

RMSI Remaining Minimum System Information

RRC Radio Resource Control

RRH Remote Radio Head

RRM Radio Resource Management

RRT RF Retuning Time

RS Reference Signal

RSCP Reference Signal Carrier Phase

RSCPD Reference Signal Carrier Phase Difference

RSSI Received Signal Strength Indicator

RSRP Reference Signal Received Power

RSRPP Reference Signal Received Path Power

RSRQ Reference Signal Received Quality

RSTD Reference Signal Time Difference

RTD Receive Timing Difference

RTOA Relative Time Of Arrival

RTT Round Trip Time

S-SSB Sidelink Synchronization Signal Block

SSB Synchronization Signal Block

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector or radiated interface boundary.

SA Standalone operation mode

SAB Satellite access band

SAN Satellite Access Node

SCC Secondary Component Carrier

SCCH Sidelink Control Channel

SCell Secondary Cell

SCG Secondary Cell Group

SCH Synchronization Channel

SCS Subcarrier Spacing

SCSSSB SSB subcarrier spacing

SDL Supplementary Downlink

SDT Small Data Transmission

SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information

SIB System Information Block

SL Sidelink

SL AoA Sidelink AoA

SL PRS-RSRP Sidelink PRS-based RSRP

SL PRS-RSRPP Sidelink PRS-based RSRPP

SL RSTD Sidelink RSTD

SL RTOA Sidelink RTOA

SL Rx-Tx Sidelink Receive-Transmit time difference

SL-PRP SL-PRS Received Power

SL-PRS Sidelink PRS

SL-RSSI Sidelink Received Signal Strength Indicator

SLPP Sidelink Positioning Protocol

SLSS Sidelink Synchronization Signal

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SRS-RSRP Sounding Reference Signal based Reference Signal Received Power

SS-RSRP Synchronization Signal based Reference Signal Received Power

SS-RSRQ Synchronization Signal based Reference Signal Received Quality

SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector.

SSS Secondary Synchronization Signal

sTAG Secondary Timing Advance Group

SUL Supplementary Uplink

TA Timing Advance

TAG Timing Advance Group

TCI Transmission Configuration Indicator

TDCP Time Domain Channel Properties

TDD Time Division Duplex

TDOA Time Difference Of Arrival

TE Test Equipment

TN Terrestrial Network

TRP Transmission-Reception Point

TRS Tracking Reference Signal

TTI Transmission Time Interval

U2N UE-to-Network

U2U UE-to-UE

UE User Equipment

UL Uplink

V2X Vehicle-to-Everything service

VIL Visible Interruption Length

VIRP Visible Interruption Repetition Period

VSAT Very Small Aperture Terminal

End of Change 1

Start of Change 2

6.3.X Conditional L1/L2-Triggered Mobility

6.3.X.1 Introduction

The purpose of CLTM cell switch is to switch PCell to a target cell based on configured CLTM execution condition.

The requirements in this clause are applicable to both intra-frequency and inter-frequency CLTM cell switch and subsequent CLTM cell switch.

The requirements in this clause are applicable only to SA, including the following scenarios:

PCell switch to a neighbouring CLTM candidate cell

- FR1 cell to FR1 cell

- FR1 cell to FR2 cell

- FR2 cell to FR2 cell

- FR2 cell to FR1 cell

PCell switch to a CLTM candidate cell that is a serving SCell in MCG

- FR1 cell to FR1 cell

- FR2 cell to FR2 cell

6.3.X.2 CLTM Cell Switch delay

Procedure delays for all procedures that can command a conditional LTM are specified in TS 38.331 [2].

When the UE receives a RRC message of LTM candidate cell configuration implying CLTM the UE shall start to transmit the new uplink transmission to the target cell fulfilling the configured CLTM condition within DCLTM seconds from the end of the last TTI containing the RRC message of LTM candidate cell configuration.

DCLTM = TRRC + TEvent\_DU + Tmeasure + TCLTM-RRC-processing + TCLTM-interrupt

Where:

* TRRC is the RRC procedure delay defined in clause 12 in TS 38.331 [2].
* TEvent\_DU is the delay uncertainty which is the time from when the UE successfully decodes a conditional LTM configuration until a condition exists at the measurement reference point which will trigger the conditional LTM cell switch.
* Tmeasure is the time for the UE to measure and realize the condition for CLTM cell switch is fulfilled. Tmeasure equals to the measurement time stated in clause 6.3.X.2.1.
* TCLTM-RRC-processing is the time for ASN.1 decoding and validity/compliance check for the RRC configuration of the CLTM target cell stated in clause 6.3.X.2.2.
* TCLTM-interrupt is the interruption time stated in clause 6.3.X.2.3.

6.3.X.2.1 Measurement time

The requirements in this clause apply under the following conditions:

1> The target cell is an FR1 cell, or

1> The target cell is an FR2 cell, and

2> there are no TCI states on the active TCI state list of any of the configured candidate cells, or

2> there is at least one TCI state on the active TCI state list of the target cell.

The measurement delay is defined from the end of TEvent\_DU until UE starts conditional cell switch execution to a target cell.

1> If SSB based L1-RSRP measurement is used in the event, Tmeasure shall be no larger than the maximum of L1-RSRP measurement periods of the serving cell and target cell.

2> serving cell measurement period TL1-RSRP\_Measurement\_Period\_SSB is defined in clause 9.5.4.1 assuming TReport = 0, and

2> if the target cell is an intra-frequency cell:

3> target cell measurement period is TL1-RSRP\_Measurement\_Period\_SSB\_intra defined in clause 9.14.5.1 assuming TReport = 0, if *deriveSSB-IndexFromCell* is enabled or UE has reported SSB index in L3 measurement report of the same cell, or

3> target cell measurement period is TL1-RSRP\_Measurement\_Period\_SSB\_intra + TSSB\_time\_index\_intra as defined in clause 9.14.5.1 assuming TReport = 0, otherwise.

2> if the target cell is an inter-frequency cell:

3> target cell measurement period is TL1-RSRP\_Measurement\_Period\_SSB\_inter defined in clause 9.15.5 or 9.15.6 assuming TReport = 0, if *deriveSSB-IndexFromCellInter-r17* is enabled or UE has reported SSB index in L3 measurement report of the same cell, or

3> target cell measurement period is TL1-RSRP\_Measurement\_Period\_SSB\_inter + TSSB\_time\_index\_inter as defined in clause 9.15.5 or 9.15.6 assuming TReport = 0, otherwise.

1> If SSB-based L3-RSRP measurement is used in the event and target cell is in FR1, Tmeasure in CHO stated in clause 6.1.4.2.2 is applicable.

1> If CSI-RS-based L1-RSRP measurement is used in the event, Tmeasure shall be no larger than the maximum of CSI-RS-based L1-RSRP measurement periods of the serving cell and the target cell.

2> serving cell measurement period TL1-RSRP\_Measurement\_Period\_CSI-RS is defined in clause 9.5.4.2 assuming TReport = 0, and

2> if the target cell is a known cell:

3> if *deriveSSB-IndexFromCell* is enabled,

4> target cell measurement period is TL1-RSRP\_Measurement\_Period\_CSI-RS\_intra defined in clause 9.14a.5 assuming TReport = 0

3> else,

4> target cell measurement period is TL1-RSRP\_Measurement\_Period\_CSI-RS\_intra + TCSI-RS\_SFN\_intra. TL1-RSRP\_Measurement\_Period\_CSI-RS\_intra is defined in clause 9.14a.5 assuming TReport = 0, and TCSI-RS\_SFN\_intra is defined in clause 9.10.2.5.

Editor notes: further discuss the side conditions for known cell based on clause 9.14a.2.

6.3.X.2.2 Conditional LTM RRC processing time

TCLTM-RRC-processing is the time for ASN.1 decoding and validity/compliance check for the RRC configuration of the CLTM target cell.

1> if the UE supports *ltm-FastProcessingConfig-r18* capability, and

2>if the number of LTM and CLTM candidate cell configurations does not exceed *maxNumberConfigs-r18* and

2>if the number of the configured serving cells and the cells in the LTM and CLTM configuration does not exceed *maxNumberStoredConfigCells-r18*

3> TCLTM-RRC-processing = 0

2> else:

3> if UE has received CLTM candidate cell TCI state activation command for the target cell at least THARQ + 13 ms before UE starts cell switch execution to the target cell, and/or

3> if UE has received PDCCH order for early RACH for the target cell at least NT,2+10 ms before UE starts cell switch execution to the target cell, where NT,2 is defined in section 8.1 of TS 38.213 [3], and

3> if the total number of LTM and CLTM candidate cells for which TCI state(s) were activated or PDCCH order was received before UE starts cell switch execution to target cell does not exceed maxNumberConfigs-r18, and

3> if the total number of serving cells and the cells in the LTM and CLTM configuration for which TCI state(s) were activated and/or PDCCH order was received before UE starts cell switch execution to the target cell does not exceed *maxNumberStoredConfigCells-r18*.

4> TCLTM-RRC-processing = 0

1> else:

2> TCLTM-RRC-processing = 10 ms.

6.3.X.2.3 Interruption time

The interruption time TCLTM-interrupt is between the time the UE starts to execute cell switch towards the target cell until the time the UE starts to transmit the new uplink transmission to the target cell, excluding TCLTM-RRC-processing.

TCLTM-interrupt = TLTM-processing + Tfirst-RS + TRS-proc + TLTM-IU ms,

Where:

- TLTM-processing is the time for UE processing, consisting of applying the target cell parameters and L1/L2 change.

1> if the UE supports *ltm-FastUE-Processing-r18* capability,

2> the value of TLTM-processing equals to

3> *fr1-r18* for FR1 to FR1 LTM cell switch.

3> *fr2-r18 for* FR2 to FR2 LTM cell switch.

3> *fr1-AndFR2-r18* for FR1 to FR2 and FR2 to FR1 LTM cell switch.

1> else:

2> the value of TLTM-processing equals to

3> 20 ms for FR1 to FR1 and FR2 to FR2 LTM cell switch.

3> 40 ms for FR1 to FR2 and FR2 to FR1 LTM cell switch.

- Tfirst-RS is the time for fine time tracking and acquiring full timing information of the target cell.

- TRS-proc is the time for SSB processing.

1> if the target TCI state is in the serving cell active TCI state list

2> Tfirst-RS = 0 and TRS-proc= 0

1> else if the UE is configured with CLTM L1 intra- and/or inter-frequency measurements for the target cell, and

2> if the target TCI state is in the CLTM candidate cell active TCI state list, and

3> if the time between receiving the CLTM candidate cell TCI state activation MAC-CE and starting to execute cell switch towards the target cell is at least TCI state activation delay stated in section 8.25.3, and

3> if the time between receiving the CLTM candidate cell TCI state activation MAC-CE and starting to execute cell switch towards the target cell is not more than TCI state activation delay stated in section 8.25.3 + 160 ms, or

3> if the measurement period of the SSB associated to target TCI state is not larger than 160 ms after the CLTM candidate cell TCI state activation MAC-CE is received

4> Tfirst-RS = 0 and TRS-proc= 0

1> else if the target cell is an FR1 cell, and the UE is not configured with CLTM L1 intra- and/or inter-frequency measurements for the target cell, and

2> if the target TCI state is in the CLTM candidate cell active TCI state list, and

3> if the time between receiving the CLTM candidate cell TCI state activation MAC-CE and starting to execute cell switch towards the target cell is at least TCI state activation delay stated in section 8.25.3, and

3> if not more than TCI state activation delay stated in section 8. 25.3 + 480 ms for an intra-frequency target cell, or

NOTE: longer L3 measurement delay may be expected for 480 ms after TCI state activation delay stated in section 8.25.3.

3> if not more than TCI state activation delay stated in section 8. 25.3 + 160 ms for an inter-frequency target cell

4> Tfirst-RS = 0 and TRS-proc= 0

2> else if the time between the latest PDCCH ordered RACH preamble transmission on the target cell and starting to execute cell switch towards the target cell is not more than 160 ms.

3> Tfirst-RS = 0 and TRS-proc= 0

1> else:

2> Tfirst-RS is the time to the first SSB transmission on the target cell after TLTM-processing.

2> TRS-proc = 2 ms.- TLTM-IU is the interruption uncertainty during CLTM cell switch.

- For RACH-based CLTM cell switch, TCLTM-IU is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. TCLTM-IU can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

- For RACH-less CLTM cell switch, TCLTM-IU is the uncertainty on transmitting the new uplink transmission on the target cell.

6.3.X.3 Subsequent CLTM Cell Switch delay

When the UE sends a *RRCReconfigurationComplete* message indicating completion of the previous CLTM cell switch the UE shall start to transmit the the new uplink transmission to the target cell fulfilling the configured CLTM condition within DSubsequent-CLTM seconds from the end of the last TTI containing the *RRCReconfigurationComplete* message.

DSubsequent-CLTM = TEvent\_DU + Tmeasure + TCLTM-RRC-processing + TCLTM-interrupt

Where:

- Tmeasure, TCLTM-RRC-processing and TCLTM-interrupt are defined in clause 6.3.X.2.

- TEvent\_DU is the delay uncertainty which is the time from when the UE successfully sends a *RRCReconfigurationComplete* message indicating completion of the previous CLTM cell switch until a condition exists at the measurement reference point which will trigger the subsequent conditional LTM cell switch.

End of Change 2