**3GPP TSG-RAN WG2 Meeting #130 Draft R2-250xxx**

**St. Julian’s, Malta, 19th – 23rd May 2025**

**Agenda Item: 8.6.1**

**Source: vivo**

**Title: Discussion report on [AT130][101][MOB] MAC open issues (vivo)**

**Document for: Discussion and Decision**

# 1 Introduction

This paper aims to capture the discussion report on the below offline discussion:

* [AT130][101][MOB] (Vivo)

 **Scope:** Discuss and attempt to make conclusion on MAC-5/13/14/15/16/17.

 **Intended outcome:** Discussion summary in R2-2504701.

**Deadline:** Wednesday (9:40-10:40, main room)

# 2. Discussion

## 2.1 Event triggered L1 measurement

### 2.1.1 MAC-5 The content of L1 MR MAC CE triggered by LTM2

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| **Index** | **Issue description** | **Rapporteur suggestion** |
| MAC-5 | **The content of L1 MR MAC CE triggered by LTM2**Editor’s NOTE: FFS For MR triggered by LTM2, whether only include the current beam information in the MR MAC CE or the MR can include measurements for LTM candidates.  | **Issue Type:** Essential**How to address it:** based on companies’ contribution |

Based on the input, there are the following options for MAC-5 open issue:

* Option 1: For MR triggered by LTM2, the measurement results of the candidate beams can be included in the MR (13 companies)
	+ Option 1-1: It is up to the NW configuration, i.e., the “*allowReportAnyBeam*” to indicate whether the UE can include measurements for LTM candidates in the MR MAC CE triggered by LTM2 (9 companies)
	+ Option 1-2: It is up to UE implementation to determine whether include measurements for LTM candidates in the MR MAC CE triggered by LTM2 (1 company)
* Option 2: For MR triggered by LTM2, only include the current beam information in the MR MAC CE (4 companies)

The following were proposed on this issue:

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| *Option 1: For MR triggered by LTM2, the measurement results of the candidate beams should also be included in the MR.***R2-2503487 OPPO**Proposal 1 For MR triggered by LTM2, the MR MAC CE can include measurements for LTM candidates.**R2-2503745 Sharp**Proposal 1. For MR triggered by LTM2, the MR MAC CE can include measurements for LTM candidates.**R2-2503802 Qualcomm Incorporated**Proposal 7: RAN2 agree to support the same report format for Event LTM2 as LTM3, i.e., candidate RSs under LTM CSI Resource Config are measured and included in L1 MR MAC CE, and the current beam reporting is configured by *reportCurrentBeam-r19* (FFS whether *reportCurrentBeam-r19* shall be set to TRUE for Event LTM2). **R2-2504115 HW**Proposal 6: (MAC-5) The measurement results of the candidate beams should also be included in the MR triggered by LTM2.**R2-2504408 Kyocera**Proposal 1 RAN2 should agree to support the option to include the beam measurement results for candidate cells in the MR MAC CE triggered by Event LTM2.**R2-2504402 CMCC**Proposal 3: If there are additional uplink resources available, the UE should be allowed to carry the measurement results of LTM candidate beams in the LTM2 MR MAC CE.*Option 1-1: It can be up to the NW to indicate whether the UE can include measurements for LTM candidates in the MR MAC CE triggered by LTM2***R2-2503435 Xiaomi****Proposal 1:** For MR triggered by LTM2, whether to include measurement results of LTM candidates is configured by the network (e.g. via field *allowReportAnyBeam*).**R2-2503554 fujitsu**Proposal 2: For the MR triggered by LTM2, based on the network configuration, the MR MAC CE can include measurements for LTM candidates in addition to the current beam. The number of beams to be reported N is applied.**R2-2503682 China Telecom**Proposal 4: For MR triggered by LTM2, the MR can include measurements for LTM candidates if the NW configures that the beam(s) not satisfying the event could be reported. Proposal 5: It is up to UE implementation to select the candidate beam to be reported in MR triggered by LTM2. **R2-2503812 Apple** Proposal 3: The MR MAC CE triggered by event LTM2 carries the following information:* The current beam info, and the current beam is always placed at the end of MR MAC CE;
* If “allowReportAnyBeam” configuration is enabled:
	+ The candidate RS info in the associated LTM-CSI-ResourceConfig,
	+ The candidate RS is regarded as the unsatisfied beams, and follows the unsatisfied beams reporting rule.

**R2-2504028 ZTE**Proposal 2 (MAC-5) It can be up to the NW to indicate whether the UE can include measurements for LTM candidates in the MR MAC CE triggered by LTM2, e.g. via reusing the allowReportAnyBeam IE or introducing a new indication.**R2-2504639 LG Electronics Inc.****Proposal 4:** For LTM MR MAC CE triggered by LTM2, beam measurement results of LTM candidates are included, if configured by network via RRC. For each LTM candidate cell, if included, only one best beam is included, if available, and its beam type is set to 11. RSRI1 and RSRP1 are set to the beam information of the best beam among the included LTM candidate beams.**Proposal 5:** For LTM MR MAC CE triggered by LTM2, serving cell beam measurement result is included in RSRPserving field.**Proposal 6**: For LTM MR MAC CE triggered by LTM2, RAN2 to decide either one of the following options for the location of RSRPserving. If Option2 is selected, discuss if this structure is also applicable for LTM MR MAC CE triggered by LTM3/4/5 universally. * Option1: RSRPserving is placed in the last octet
* Option2: RSRPserving is placed in the 2nd octet

**Proposal 7:** After transmitting truncated LTM MR MAC CE triggered by LTM2, UE cancels the triggered MR. *Option 1-2: It can be up to UE implementation to determine whether include measurements for LTM candidates in the MR MAC CE triggered by LTM2***R2-2503859 Ericsson**Proposal 4: It is up to UE implementation to include measured beams for other LTM candidate cells when reporting a L1 MR MAC CE triggered by a LTM2 event.*Option 2: For MR triggered by LTM2, only include the current beam information in the MR MAC CE***R2-2503410 CATT**Proposal 2: For an MR triggered by event LTM2, the MR MAC CE includes only the current beam information.**R2- 2503469 MTK**Proposal 5: For LTM2, only current beam information is included in the MR MAC CE.**R2-2503618 vivo**Proposal 1: For L1 MR triggered by LTM2, only the current beam information is included in the L1 MR MAC CE.**R2-2503989 NEC**Proposal 1: For MR triggered by LTM2, the UE includes only the current beam information in the MR MAC CE. |

Based on above, rapporteur has re-structure the below proposal for discussion.

**Proposal 1: It is up to the NW configuration, i.e., the “allowReportAnyBeam” to indicate whether the UE can include measurements for LTM candidates in the MR MAC CE triggered by LTM2.**

**Proposal 2: For MR triggered by LTM2, if measurements for LTM candidates is configured to be included in the MR MAC CE, which LTM candidate beam should be included:**

* **RS(s) associated with the report ID for LTM2**
* **RS(s) associated with the report ID for other LTMx**

**Discussion:**

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| **Offline agreement:** |

2.1.2 MAC-15 Cancellation condition of Triggered MR

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| MAC-15 | **Whether the triggered MR should be cancelled in the below case: if all the triggered beam(s), i.e. Type#00 and Type#01, have been reported, no matter whether truncated MR MAC CE or regular MR MAC CE is used before, the trigger MR should be cancelled.**Raised by Apple during the discussion. | **Issue Type:** Essential**How to address it:** based on companies’ contribution |

Based on the input, the following options could be considered:

* Option 1: If all triggered beam(s) have been reported in the previous (truncated) MR MAC CE, the MR could be cancelled.
* Option 2: If the original complete MR for the corresponding ltm-CSI-ReportConfigId has been successfully transmitted, the MR could be cancelled.
* Option 3: Only when a normal (not-truncated) L1 measurement report MAC CE is reported, the MR could be cancelled.
* Option 4: If all Type00/01/10 beams have been reported in the previous (truncated) MR MAC CE, the MR could be cancelled.

The following were proposed on this issue:

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| ***Option 1:*** **R2-2503812 Apple**Proposal 5: If one truncated/regular MR MAC CE includes all the triggered beams, the triggered MR is cancelled. Proposal 6: One truncated/regular MR MAC CE shall include at least one triggered beam.**R2- 2503469 MTK**Proposal 6: If all newly triggered beams (entry and leaving) have been reported, but the remaining beams (old triggered beams and irrelevant beams) are not reported due to resource limitations, subsequent MR for those beams is unnecessary, and the triggered MR should be cancelled.**R2-2503745 Sharp**Proposal 2. The triggered MR should be cancelled if all the triggered beam(s) have been reported.**R2-2504028 ZTE**Proposal 4 (MAC-15) The MR should be cancelled (or not be triggered again), if all triggered beam(s) have been reported in the previous (truncated) MR MAC CE, even if there are some other beam information (e.g. for Type 3 and Type 4 beam) not included in the previous MAC CE.**R2-2504263 Ofinno**Proposal 6: (MAC-15) A triggered L1 MR is cancelled when all the triggered beams of the MR are transmitted***Option 2:*****R2-2503410 CATT**Proposal 3: The triggered MR is only cancelled once the original complete MR for the corresponding ltm-CSI-ReportConfigId has been successfully transmitted.**R2-2503435 Xiaomi** Proposal 7: (MAC-15) Triggering of MR is only cancelled when all beams are reported according to configuration (i.e. maxNumberOfReportedBeams-r19, allowReportAnyBeam-r19, reportCurrentBeam-r19).**Proposal 8:** A note is added to clarify that “Event Triggered L1 MR MAC CE is considered as regular MAC CE (i.e. not truncated MAC CE) if it contains information of all the remaining beams after truncated MAC CE is sent.”***Option 3:*****R2-2503618 vivo**Proposal 3: RAN2 agrees to only adopt the simple cancelling condition as in current MAC running CR, i.e. the triggering status of the truncated L1 MR MAC CE is cancelled when the normal (not-truncated) L1 measurement report MAC CE is reported in following grant(s).**R2-2503989 NEC**Proposal 4: RAN2 to select one of the following two approaches:* Approach 1 (using current running CR as baseline)
	+ *Normal MR MAC CE is used only when the MAC CE can include all the Type1, 2 beams and serving beam at least. Otherwise, the truncated MR MAC CE is used.*
	+ *UE cancels the measurement report when the normal MR MAC CE is used.*
* Approach 2 (alternative)
	+ *Normal MR MAC CE is used only when the MAC CE can include all the Type1, 2 beams, serving beam and the Type3, 4 beams up to N in total. Otherwise, the truncated MR MAC CE is used.*
	+ *UE cancels the measurement report when the normal MR MAC CE is used, or if there is no remaining Type1, 2 beam when the truncated MR MAC CE is used.*

***Option 4:*****R2-2504639 LG Electronics Inc****Proposal 10**: After transmitting truncated MR MAC CE, if there is at least one type00, type01 or type10 beam, triggered MR is not cancelled.  |

Based on above, rapporteur has re-structure the below proposal for discussion.

**Proposal 3: The triggered MR is cancelled in the below case: if all the triggered beam(s), i.e. Type#00 and Type#01, have been reported, no matter whether truncated MR MAC CE or regular MR MAC CE is used before.**

**Discussion:**

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| **Offline agreement:** |

2.2.6 MAC-16 Cancellation of Triggered MR in some cases

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| MAC-16 | **Whether the triggered MR should be cancelled in the below two cases:*** Case 1: When a beam (or multiple beam) meents the entry condition for TTT (Type#00), a MR will be triggered. Before getting the UL grant, if this beam (or all these beams) meets the leaving condition, then, whether this MR is still triggered or should be cancelled?
* Case 2: When a beam (or multiple beam) in the reporting list meents the leaving condition for TTT (Type#01), a MR will be triggered. Before getting the UL grant, if this beam (or all these beams) meets the entry condition again, then, whether this MR is still triggered or should be cancelled?

Raised by Apple during the discussion. | **Issue Type:** Essential**How to address it:** based on companies’ contribution |

The following were proposed on this issue, and all proposed companies have the same views on this issue:

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| **R2-2503435 Xiaomi** **Proposal 9: (MAC-16)** When a beam meets the entering condition and later meets the leaving condition before receiving UL grant, or vice versa, the triggered MR should be cancelled.**R2- 2503469 MTK**Proposal 7: If a beam (or multiple beams) meets the entry/leaving condition and an MR is triggered, but before obtaining the UL grant, the leaving/entry condition is met, the MR trigger is cancelled, and no MR is sent.**R2-2503812 Apple**Proposal 7: For Type 1 or Type 2 beams (i.e., beams that have met the triggering conditions but have not yet been reported), if the conditions are no longer met before reporting, the MRs triggered by these beams will be cancelled.**R2-2503745 Sharp**Proposal 3. The triggered MR should be cancelled when a beam (or multiple beam) meets the entry condition for TTT and before getting the UL grant this beam (or all these beams) meets the leaving condition.Proposal 4. The triggered MR should be cancelled when a beam (or multiple beam) meets the leaving condition for TTT and before getting the UL grant this beam (or all these beams) meets the entry condition.**R2-2504028 ZTE**Proposal 5a (MAC-16) The MR should be cancelled (or not be triggered), if a beam meeting the entry condition firstly and then meeting the leaving condition before getting the UL grant, i.e. to report to the NW.Proposal 5b (MAC-16) The MR should be cancelled (or not be triggered), if a beam meeting the leaving condition firstly and then meeting the entry condition before getting the UL grant, i.e. to report to the NW.**R2-2504639 LG Electronics Inc****Proposal 11**: If a beam which triggered the MR due to entering (or leaving) condition with TTT satisfies leaving (or entering) condition with TTT before receiving UL grant, cancel the triggered MR**R2-2504263 Ofinno**Proposal 7: (MAC-16) When an L1 MR is triggered and not transmitted, and if a beam that triggered an L1 MR upon satisfying an entering condition of an event satisfies a leaving condition of the event, the triggered MR is cancelled. |

Based on above, rapporteur has re-structure the below proposal for discussion.

**Proposal 4: The triggered MR should be cancelled when a beam (or multiple beam) meets the entry condition for TTT, and before getting the UL grant, this beam (or all these beams) meets the leaving condition.**

**Proposal 5: The triggered MR should be cancelled when a beam (or multiple beam) meets the leaving condition for TTT and before getting the UL grant this beam (or all these beams) meets the entry condition.**

**Discussion:**

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| **Offline agreement:** |

2.2.7 MAC-17 Dedicated SR for L1 MR MAC CE

FFS how to handle the case if the dedicated SR configuration for L1 measurement report MAC CE transmission is not configured, when MR is triggered. We have the following agreements on dedicated SR for L1 MR MAC CE:

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| 1. The legacy SR procedure for resource allocation is the baseline to send the event-triggered L1 measurements MAC CE.
2. NW can configure a dedicated SR configuration for MR MAC CE transmission.
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Based on the input, if the dedicated SR configuration for L1 measurement report MAC CE transmission is not configured, the following options could be considered when MR is triggered:

* Option 1: SR will be triggered;
* Option 2: RACH procedure will be triggered.

The following were proposed on this issue:

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| ***Option 1:*** **R2-2503435 Xiaomi** Proposal 10: (MAC-17) When L1 measurement is triggered and UL-SCH resource is not available, SR is triggered irrespective of whether dedicated SR configuration is configured or not.Proposal 11: (MAC-17) If the dedicated SR configuration for L1 measurement report MAC CE is not configured, when L1 measurement is triggered and there is no UL-SCH resource available, SR is triggered, and RACH is triggered consequently. No specification change is needed.***Option 2:*****R2-2503812 Apple**Proposal 4: When LTM MR is triggered, if there is no available UL resource for the LTM MR transmission and MR specific PUCCH-SR is not configured, UE will trigger RACH procedure.**R2-2503487 OPPO**Proposal 7: If no dedicated SR is provided, RACH procedure is triggered to request the UL grant for MR MAC CE transmission.Proposal 8: The SR triggered for L1 event-triggered measurement report is cancelled if a MAC PDU is transmitted and this PDU includes L1 MR MAC CE or truncated MR MAC CE.Proposal 9: When the MAC entity has PUCCH resource for pending SR for L1 event triggered MR and the MAC entity has one or more PUCCH resources overlapping with PUCCH resource for “other triggered SR”, UE selects PUCCH resource based on:* Option 1: left for UE implementation.
* Option2: MAC entity considers the PUCCH resource for L1 event triggered MR MAC CE as valid.
* Option3: if “other triggered SR” is for BFR, the MAC entity considers the PUCCH resource for beam failure recovery as valid.

**R2-2504402 CMCC**Proposal 7: If there is no dedicated SR configuration assigned for L1 measurement report MAC CE transmission, then an uplink grant should be requested through the RACH procedure. In addition, similar to the BFR processing in SpCell, the UE should be allowed to carry the MR MAC CE in the transmitted Msg 3. |

Based on above, rapporteur has re-structure the below proposal for discussion.

**Proposal 6: When MR is triggered, if the dedicated SR configuration for L1 measurement report MAC CE transmission is not configured, UE will trigger RACH procedure.**

**Discussion:**

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| **Offline agreement:** |

2.2 Conditional intra-CU LTM

2.2.1 MAC-13 coexistence between CLTM and (e)RedCap/CovEnh

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| **Index** | **Issue description** | **Rapporteur suggestion** |
| MAC-13 | **FFS the coexistence between CLTM and (e)RedCap, CovEnh?**Editor’s NOTE: Whether/How CLTM could co-exist with (e)RedCap is FFS, i.e. whether follow Rel-18 intra-CU LTM as below. Editor’s NOTE: Whether/How CLTM could co-exist with CovEnh is FFS, i.e. whether follow Rel-18 intra-CU LTM as below.  | **Issue Type:** Not essential but important**How to address it:** based on companies’ contribution |

The following were proposed on this issue:

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| **R2-2504049 LG Electronics Inc.**Proposal 6. Support coexistence between Rel-19 CLTM and (e)RedCap.Proposal 7. Support coexistence between Rel-19 CLTM and CovEnh.**R2-2504283 Nokia**Proposal 14. Support coexistence of Rel-19 CLTM with (e)RedCap and CovEnh.**R2-2503813 Apple**Proposal 3: Support the coexistence between CLTM and (e)RedCap, CovEnh. **R2-2503411 CATT:**Proposal 10a: (MAC-13) Support the co-existence of CLTM and (e)RedCap.Proposal 10b: (MAC-13) Support the co-existence of CLTM and CovEnh.**R2-2503455 Lekha Wireless Solutions**Proposal 9: CLTM can be applied to (e)RedCap UEs with minimal tailoring, e.g., using fewer measurement events, relaxed filtering, and pre-indicated beams for CG.Proposal 10:The LTM procedure's flexibility allows adaptation to RedCap’s reduced complexity and CovEnh's repetition-oriented structure. Conditional triggering reduces control overhead, aligns with power/performance limitations, and offers robust handover in weak coverage scenarios. Proposal 11: Supporting coexistence between Rel-19 Conditional LTM and both (e)RedCap and CovEnh. **R2-2503931 NEC**Proposal 3. Support co-existence between CLTM and (e)RedCap and CovEnh without additional specification effort. |

Basically, companies have consensus that the co-existence of CLTM and (e)RedCap, and the co-existence of CLTM and CovEnh, does not have additional specification effort and can be supported.

**Proposal 7: Support the co-existence of CLTM and (e)RedCap.**

**Proposal 8: Support the co-existence of CLTM and CovEnh.**

**Discussion:**

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| **Offline agreement:** |

2.2.2 MAC-14 CLTM candidate TAT timer

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| **Index** | **Issue description** | **Rapporteur suggestion** |
| MAC-14 | **FFS for the case when CLTM candidate TAT timer is running, an (Enhanced) LTM Cell switch Command MAC CE is received**Editor’s NOTE: FFS for the case when CLTM candidate TAT timer is running, an (Enhanced) LTM Cell switch Command MAC CE is received. [Rapp]: New added based on Anil’s comments. | **Issue Type:** Not essential but important**How to address it:** based on companies’ contribution |

The following were proposed on this issue:

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| **R2-2503411 CATT:**Proposal 2: (MAC-14) Upon receiving (Enhanced) LTM Cell switch Command MAC CE, UE performs RACH-less LTM cell switch only if the MAC CE includes a valid TA value or UE has performed UE based TA measurement to the target cell, regardless of whether CLTM candidate TAT timer is running for the target cell.**R2-2503860 Ericsson**Proposal 4: If the network sends a LTM cell switch MAC CE with value “FFF” for the TA value, and the UE has a valid TA (either because previously send by the network or because of UE-based TA), the UE performs a RACH-less LTM cell switch procedure.**R2-2503470 MediaTek Inc**Proposal 10: When the UE receives the LTM CSC MAC CE while the event evaluation for CLTM is ongoing, the UE should prioritize TA acquisition as follows:1. The new TA indicated in the LTM CSC MAC CE.
2. The valid TA with a running CLTM TAT.
3. RACH-based LTM.

**R2-2503803 Qualcomm Incorporated**Proposal 2: RAN2 agree to support RACH-less CLTM recovery for Rel-19 intra-CU CLTM when the following conditions are met:1. The selected cell is one of CLTM candidate cell AND
2. The selected CLTM candidate cell has configured CG resource AND
3. UE has a valid TA for the selected CLTM candidate cell by either (i) TA from TA MAC CE for which TA timer is running or (ii) UE-measured TA.

**R2-2503619 vivo**Proposal 5: (MAC-14) If a UE receives an (Enhanced) LTM Cell Switch Command MAC CE without valid TA and CFRA resource while the CLTM candidate TAT timer for the target cell is running, it shall perform RACH-less LTM.Proposal 6: (MAC-14) If an LTM Cell switch Command MAC CE with valid TA is received, UE shall store the TA value for the target cell and start or restart the CLTM TAT of the target cell.**R2-2503813 Apple**Proposal 4: When UE receives the LTM cell switch command, UE will reset all the C-TATimers if running and clean the stored C-TA value. **R2-2504269 Ofinno**Proposal 2: (MAC-14) If UE receives LTM cell switch command MAC CE for LTM to a candidate cell while TA timer for the candidate cell is running, the UE uses the TA value indicated in the LTM cell switch command MAC CE and not the TA value received prior to receiving the LTM cell switch command MAC CE.Proposal 3: (MAC-14) TA timer for candidate cell is continued (not stopped) when MAC reset is performed due to a reconfiguration with sync procedure.Proposal 4: (MAC-14) Stop TA timer or a candidate cell when the candidate cell configuration corresponding to the CLTM candidate cell is released.**R2-2503533 Xiaomi**Proposal 5: (MAC-14) The valid candidate TA stored by UE cannot be used for MAC CE triggered LTM.**R2-2503555 Fujitsu**Proposal 1: When the LTM CSC MAC CE indicating a CLTM candidate and its TA to FFF, the stored TA provided by the early TAC MAC CE can be used if the corresponding early TAT is running. **R2-2504283 Nokia**Proposal 10: Upon reception of CSC with TAC equal to “FFF” and if the UE has already acquired a TA value over an LTM Candidate Timing Advance Command MAC CE whose TAT is still running, the UE uses the TA value for RACH-less cell switch and starts the serving cell TAT using the remaining time of the LTM candidate TAT of the target candidate configuration. |

It seems most companies agree that the UE can use the TA value provided by the early TAC MAC CE and perform RACH-less LTM when LTM cell switch command is received with no valid TA (e.g. with value set to ‘FFF’).

**Proposal 9: When the UE receives the (Enhanced) LTM CSC MAC CE with no valid TA (e.g. with value set to ‘FFF’), the UE performs RACH-less LTM if the CLTM candidate TAT timer is running for the target cell.**

**Discussion:**

Besides, in RAN2#129bis, it was agreed that:

* C-LTM TAT for target cell is not stopped upon C-LTM cell switch execution to the target cell if it is running, and starts the PTAG using the remaining time from the C-LTM timer.

Some companies proposed that if the network sends a (enhanced) LTM Cell switch Command MAC CE with valid TA for the target cell, the UE should store the TA value for the target cell and the C-LTM TAT for the target cell should be started or restarted for the subsequent CLTM procedures.

**Proposal 10: If a (enhanced) LTM Cell switch Command MAC CE with valid TA is received, UE shall store the TA value for the target cell and start or restart the CLTM TAT of the target cell.**

**Discussion:**

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| **Offline agreement:** |

# 3 Conclusion

Based on the discussion above, we have the following offline agreement:

**Proposal: RAN2 to agree the below offline agreement:**

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| **Offline agreement** |

4 Reference

1. Xxxx