3GPP TSG-RAN WG2 Meeting #131 R2-25xxxxx

Bangalore, India, 25th – 29th of August 2025

**Agenda item: 8.6.1**

**Source: Nokia**

**Title: Report from [POST130][117][MOB] (Nokia)**

**WID/SID: NR\_Mob\_Ph4-Core - Release 19**

**Document for: Discussion and Decision**

# 1 Introduction

This is to discuss the following aspects:

* [POST130][117][MOB] (Nokia)

**Scope:** Discuss issues of coexistence between L1 event triggered MR and mTRP (source cell).

1. Whether to allow coexistence between event triggered MR and mTRP (source cell)?
2. How to define the current beam?

**Intended outcome:** Summary discussion.

**Deadline:** Long email discussion

Further details are given in the following sections.

# 2 Discussion

During the discussion in April 2025 (RAN2#129bis) the following agreement has been captured in the Chairman notes [1]:

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| --- |
| * Will be revisited in August. If one simple solution is not prepared / agreed until / in August meeting, we will not apply mTRP in Rel-19 event-triggered MR. |

In line with the aforementioned decision, the topic has not been discussed in May 2025 (RAN2#130). Instead, this e-mail discussion has been approved to take advantage of the time in between RAN2#130 and RAN#131 meetings to clarify all aspects that might need to be resolved for mTRP in the serving cell to become a part of Rel-19 event-triggered measurement reporting (MR) design.

The coexistence between mTRP and event-triggered L1 MR has been described in numerous papers submitted to RAN2#130 and the preceding meetings. Relevant TDocs are listed in References section, see at least [2] - [7]. Please note that References section does not provide all possibly relevant 3GPP papers but is just supposed to confirm what is considered in this post-meeting e-mail thread had significant support within RAN2 community.

Please also note that the aim of this document is not to elaborate in detail on the technical merits of mTRP as such. However, as has been briefly introduced in [2], with mTRP, the serving cell can schedule the UE from two transmission/reception points (TRPs). This enhances the coverage, reliability and possibly also the achievable data rates. Thus, from the network’s perspective it is preferable if such scheme can coexist with what is being defined in Release 19 (i.e. event-triggered L1 measurement reporting).

## 2.1 Current beam selection for event evaluation and MR MAC CE

RAN2#130 has tasked the rapporteur to resolve how to define the “current beam in MR MAC CE”. As a brief reminder, in the latest version of the endorsed MAC CR the corresponding MR MAC CE looks as follows [8]:



Fig. 1. Event Triggered L1 Measurement Report MAC CE - as proposed in the endorsed CR.

As can be seen in Fig. 1, the last octet is used for sending the RSRP measurement result (7 bits) corresponding to the serving beam (a.k.a. current beam). The single remaining bit in this octet is reserved (R). RAN2 needs to decide how this serving beam is selected in case of mTRP operation. In the papers submitted to RAN2#130 (e.g. [2] - [7]) various approaches have been presented, e.g.:

1. UE should use the best beam of the two current beams for event evaluation [2]
2. It is up to the UE which of the two beams it uses for event evaluation [7]
3. Network can indicate which beam the UE shall use

Probably all of the listed options are feasible and not overly complex (i.e. can be finalized within Release 19 timeline). Companies are encouraged to express their preference below.

**Question 1: How the UE selects the serving beam to be included in the MR MAC CE when mTRP is configured in the serving cell? Please select from the options listed below:**

1. **UE should use the best beam of the two “current beams” for event evaluation**
2. **It is up to the UE which of the two beams it uses for L1 event evaluation**
3. **Network indicates which beam the UE shall use**
4. **Specify to use one of the two TCI states (e.g., just use the first indicated TCI state)**
5. **Other**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| Nokia | a) | Using the best beam (in terms of RSRP) is an acceptable option. We could be also OK to leave the selection to the UE (i.e. option b)). |
| ZTE | a) | Option a) is simple and straightforward. From UE implementation perspective, the UE can also consider both if the UE does not want to compare which serving beam is the best. |
| Ofinno | c) | We support Option c. In this option, the network can flexibly indicate which of the two TCI states should be used by the UE for L1 event evaluation. This can be achieved by introducing a new RRC parameter in the *LTM-CSI-ReportConfig*. Option c also does not require any modification to the current format of the MR MAC CE.  In contrast, both Option a and Option b would require additional indication in the MR MAC CE, as discussed in Question 2. Furthermore, Option a may lead to delayed reporting, since the “best beam” can change dynamically. It also introduces ambiguity in the inter-cell mTRP scenario, where the best beam might belong to a non-serving cell. |
| vivo | d) | When the source cell is configured with mTRP, the number of the indicated TCI states will be 2.  In RAN1, there is such kind of definition of first/second TCI state, so the simplest way is that we just choose one of the two TCI states, e.g., the first indicated TCI state (or second, if one wants to), and use that as the current serving beam. This can be just specified in the specification and UE complexity (e.g., compare the two and choose better one) can be avoid.  The concrete definition can just refer to RAN1 TS 38.214. e.g., according to following text in clause 5.1.5:  *When a UE is configured with dl-OrJointTCI-StateList and is having two indicated TCI-states, if the UE receives a TCI codepoint mapped with a sub-set of first and second TCI-State(s) and/or a sub-set of first and second TCI-UL-State(s), the UE shall update the first/second TCI-State(s) and/or first/second TCI-UL-State(s) mapped to the TCI codepoint, when applicable, and keep the previously indicated first/second TCI-State(s) and/or first/second TCI-UL-State(s) that is/are not updated by the TCI codepoint.* |
| Rakuten | e) | We support the option where the UE evaluates the event for both the current beams and report the event if either of the current beams satisfy the event. This is useful since the “best beam” can change dynamically, after the evaluation has started. |
| OPPO | a) or b) | Either a) or b) is fine for us. |
| Samsung | a) or d) | Using the best beam among the TRPs is reasonable but if we go to the simplest approach, we are also fine to just ignore the 2nd TRP in serving cell for LTM mobility. |
| Ericsson | a) | This seems the more natural solution. Also, we need to make sure that the beam reported is exactly the one that the UE measures. |
| NEC | a) | Option a) is the most simple and straightforward one. |
| Kyocera | a) | We think Option a) is not only simple but also accurate for LTM decisions. |
| MediaTek | b) | From system performance perspective, it’s better that UE always uses the best serving beam. However, it may need extra UE complexity to check if the previous best beam is still the best beam, as UE doesn't need to continuously measure/monitor the quality for these serving beams.  For example, UE measures Beam1 in T1 and measures Beam2 in T2 with a higher quantity. So in T2,   1. Does UE need to also measure Beam1 to make sure that Beam2 is the best at that moment?   Or   1. UE only need to compare it with the Beam1 in T1 in the history?   For ①, it introduces extra measurement requirement.  For ②, how far back in history the measurement result is considered to be valid to be compared with? (Note that T2 and T1 may not be in the same SSB period)  **Consider this, we think a) has UE impact/spec complexity.**  For c) or d): UE has better vision on which beam is better in short time. Network may not know as RSRP fluctuate greatly. Letting network to choose one beam will lose the benefit of mTRP. |
| CATT | a) or c) | Option a) is simple and option c) leaves more flexibility to NW control. |
| Huawei, HiSilicon | a) | We think option a) is better  (1) there is no impact for the currently agreed format for MR report MAC CE (2) it is enough that the NW knows the quality of the best beam for the serving cell |
| Lenovo | A or b |  |
| LGE | a | Option a) is simple and straightforward. |
| Xiaomi | a) or b) | We are OK to either use the best beam or leave the decision to UE implementation. |
| Sharp | a | Option a) is simple and straightforward. In addition, upon reception of a measurement report triggered by Event 2/3/5, the network may identify both current beams whose RSRP is below the configured threshold. |
| HONOR | a) | We prefer Opt. a. Based on the motivation for the MAC MR, the best beam based on the latest measurement needs to be considering in the evaluation. |
| KDDI | a | Option a) is simple and straightforward. |
| NTT DOCOMO | a) | Option a) is most simplest. |

**Summary for Q1:**

* Some companies indicate the best beam can change dynamically, so option a) may not always work.
* Some other suggest to have a fixed specification text stating if the first or second TCI state is to be used.
* One company raised a concern on whether the comparison between TCI states is meaningful as the RSRP might have been measured at different time instances.
* An overwhelming majority (16 out of 20 companies) is fine with option a) “UE should use the best beam of the two “current beams” for event evaluation”. Thus, that would be a suggested conclusion for this question.

**Proposal 1: When mTRP is configured in the serving cell the UE uses the best beam (in terms of RSRP) of the two “current beams” for LTM event evaluation.**

## 2.2 Association between the serving beam and the reported RSRP

In [2] it was also underlined that MR MAC CE may possibly include also an indication for which beam/TCI the RSRP value is reported. As can be seen in Fig. 1 current MR MAC CE has no ID information for the serving beam. It may not be problematic when mTRP is not used. However, in case of mTRP operation and if option a) or option b) listed in Q1 is adopted, the NW does not know what the reported RSRP value corresponds to. Thus, in rapporteur’s view such indication could be included in MR MAC CE, of course subject to the ultimate decision taken for Q2. It is worth underlining the last octet in MR MAC CE comprises one reserved (R) bit which can be used to indicate one of the two TCI states in mTRP operation.

**Question 2: Do you agree to indicate in MR MAC CE when mTRP is used which TCI state is associated with the reported RSRP value for the serving/current beam?**

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comments** |
| Nokia | Yes | As answered to Q1, we believe it could be acceptable to the NW to let the UE choose which of the beams is selected as the “current beam” and therefore used for event evaluation. Then the same beam is obviously included in the MR MAC CE. However, NW needs to know the TCI state that the reported RSRPserving is referring to. That is why we suggest to use the reserved bit in the last octet for this purpose. |
| ZTE | No | The benefit of reporting serving TRP info is a bit unclear to us. In our view, the candidate beam information is more important in MR MAC CE, as long as the best serving beam is considered in event evaluation (option a), it does not matter whether it is from TRP-0 or TRP-1.  If Option b is adopted, it means the UE may use different serving beams for event evaluation during TTT (e.g. serving beam#1 from TRP-0 at T0, serving beam#5 from TRP-1 at T1), then, it is unclear which TRP Id needs to be indicated in the final MR MAC CE. |
| Ofinno | No (we support option c, but) | If Option c in Question 1 is agreed, there is no impact on the MR MAC CE format. In this case, the network explicitly configures which TCI state the UE shall use for event evaluation, and thus there is no ambiguity regarding the RSRP value reported in the MR MAC CE.  For Option a or Option b, we think the UE has to indicate whether the first or second TCI state was used for the event evaluation. We are fine with utilizing the R bit. |
| vivo | No | As replied in question 1, if we clearly specified which TCI state should be used (e.g., the first or the second one), then there is no need of indicated which TRP the beam is from. We also would like not to further introduce more optimizations on the MAC CE format design. |
| Rakuten | Yes | As answered for Q1, if the UE uses either of the current beams to evaluate the event, the NW needs to know the TCI state that the reported RSRPserving is referring to. So, we are ok to use the reserved bit in the last octet for this purpose. |
| OPPO | Yes | If we go for option a or b in Q1, the indication is required for NW to differentiate which TRP the current beam associated with. |
| Samsung | No | Agree with ZTE. We do not see the clear reason for NW to know which TRP’s beam is used for the current beam. Even though RSRPserving is reported the TRP association information is not really needed to NW to support LTM cell switch i.e. NW could decide the candidate cell without this information. |
| ZTE | No | We agree with ZTE and Samsung. |
| NEC | Yes | We think it is better to indicate the measurement quantity of the serving cell corresponds to which TRP, and this can be supported easily without further increasing the size of the MR MAC CE. |
| Kyocera | No | We agree with ZTE and Samsung. |
| MediaTek | No | The motivation is to bring candidate cell beam information to network, not serving beam. |
| CATT | No | agree with ZTE and Samsung. No motivation for NW to know which TRP’s beam is used for the current beam |
| Huawei, Hisilicon | Yes | It is better to let the gNB to differentiate between the two beams, a beam index for the measurement report might be required. |
| Lenovo | No | Agree with ZTE and Samsung. |
| LGE | No | Same view with ZTE and Samsung. |
| Xiaomi | No | Agree with ZTE and Samsung that there is no clear motivation for the network to know the serving beam used for evaluation. |
| Sharp | No | Agree with ZTE and Samsung. |
| HONOR | Yes | Based on the Opt. a, the UE would take the best serving beam in the evaluation, but the NW has no idea which beam the reported RSRP. However, for the R bit indication part, we are not sure if this is needed. |
| KDDI | Yes | When the UE evaluates the event using either of the current beams, the NW might be required which TCI state the reported RSRPserving corresponds to. We are therefore fine with using the reserved bit in the final octet to indicate this.  In addition, when multiple TRPs are active, reporting only the RSRP value does not tell the network which TRP/beam the measurement is associated with, making optimal control and handover decisions difficult. By leveraging reserved bits in the MR MAC CE to explicitly indicate the selected TCI state (beam/TRP), the network can make more precise cell change/handover decisions and improve scheduling accuracy. |
| NTT DOCOMO | No | Same view with ZTE and Samsung |

**Summary for Q2:**

* Multiple companies indicate that the network does not need to know for which TRP is the reported serving beam’s RSRP, as candidate beam’s information is more important.
* Seven companies responded “Yes’ and they believe the network should possess such information in MR MAC CE.
* Rapporteur is a bit puzzled why companies state the exact information about the serving TRP is not important for the NW to know. Thus, it is suggested to clarify this further at the meeting

**Proposal 2: RAN2 to discuss if the NW needs to know the exact TRP and thus MR MAC CE shall indicate the TCI state associated with the reported RSRP value for the serving/current beam.**

## 2.3 Whether to allow the coexistence between mTRP and event-triggered L1 MR

RAN2#130 has also tasked the rapporteur to check whether the companies support the coexistence between mTRP in the serving cell and event-triggered L1 measurement reporting. Thus, we would like to ask the ultimate question:

**Question 3: Do you support specifying the coexistence between event-triggered L1 measurement reporting and mTRP for the source cell? Please consider the technical aspects discussed above (for Q1 and Q2).**

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comments** |
| Nokia | Yes | We agree with the background information given in [2] and in the introduction text in section 2 of this report. With mTRP the serving cell can schedule the UE from two transmission/reception points and thanks to this, the coverage, reliability and data rates can be improved.  We also believe the introduction of mTRP coexistence with event-triggered L1 measurement reporting is not complex, as discussed in the preceding subsections. Thus, we see no obstacles in having this supported within Rel-19 framework. |
| ZTE | Yes | mTRP is a very important deployment scenario in 5G. Also, event-triggered L1 MR is an important feature for L1 measurement triggered LTM. If coexistence cannot be supported, it means the network must disable one of them, either the UE cannot be benefit from mTRP, or the periodical L1 results reporting needs to be configured (which increases signalling overhead and UE’s power consumption). So, such limitation will impact both system and UE’s performance.  We agree with Nokia that we should strive for a simple solution that eliminates UE/chipset vendors’ concerns about implementation complexity, but not to just add restrictions. |
| Ofinno | Yes | We support the coexistence of LTM event-triggered reporting and mTRP operation at the serving cell. Since Release 18 LTM already supports mTRP, it is reasonable that Release 19 LTM continues to support mTRP as well. There is no justification to limit the Release 19 mobility enhancements to single-TRP operation.  Furthermore, the changes proposed in Question 1 and Question 2 are relatively minor and can be realized with minimal impact to the specifications. Therefore, this feature can be supported within the Release 19 timeline. |
| vivo | Yes | In Rel-18 LTM, source cell configured with mTRP is naturally supported with no specification efforts, and target cell configured with mTRP under two TAGs is also supported. We understand that coexistence between mTRP in the serving cell and event-triggered L1 measurement reporting should also be considered in R19.  Meanwhile, we don’t really think there is technical issues to achieve this, as we replied before, if companies cannot reach consensus on which beam to use as the current beam, we can just ‘arbitrarily’ decide one (first or second TCI state) then the left issues are almost the same as single TRP case. |
| Rakuten | Yes | We agree with Nokia that with the introduction of mTRP, the serving cell can schedule the UE from two transmission/reception points and thanks to this, the coverage, reliability and data rates can be improved.  Moreover, introduction of mTRP coexistence with event-triggered L1 measurement reporting is simple and not complex as it was suggested. |
| OPPO | Yes | As we agreed, mTRP MIMO 2TA can be configured with inter-CU LTM candidate and CLTM candidate, and LTM support subsequent cell switch execution. We understand current agreements have implicitly indicated the coexistence between event triggered L1 MR and mTRP at serving cell. Otherwise, NW has to reconfigure the LTM candidate/serving cell to disable mTRP function. |
| Samsung | Yes | We do not see the big spec impact to block the coexistence between event-triggered L1 measurement reporting and mTRP for the source cell. Usually, two functions have no critical impact to do not support simultaneously RAN2 could support it. |
| Ericsson | Yes | We don’t see a big problem to support this co-existance. |
| NEC | Yes | Agree with companies above. |
| Kyocera | Yes | We agree with companies above. |
| MediaTek | - | It can be support only if we reach an consensus in Q1 and Q2. |
| CATT | Yes | As configuring mTRP in serving cell is not a rare case and the solution is not complex,we see no reason to not support it. |
| Huawei, HiSIlicon | Yes | The mTRP was introduced in R16 under the background of R15 NR that only ideal backhaul between different access points are supported that this might not be realistic in all the cases, especially for the scenarios for distributed antennas that extend the coverage of the cell. Event-triggered LTM is also related to service continuity of the UE, which is also an issue related with mTRP. |
| Lenovo | See comments | If there is no enhancement for MAC CE proposed in Q2, we can support this coexistence. |
| LGE | Yes | We think both multi-TRP and event triggered L1 MR are key features for 5G NR. So, it would be good to support the coexistence between them. |
| Xiaomi | - | RAN2#129bis meeting agreed that “*If one simple solution is not prepared / agreed until / in August meeting, we will not apply mTRP in Rel-19 event-triggered MR.*” We are fine to support the coexistence between event-triggered L1 measurement reporting and mTRP for the source cell if consensus can be reached to have a simple soluiton. |
| Sharp | Yes | We support specifying the coexistence. We believe that the issues to be solved for coexistence are not complex and that the technical advantages of supporting coexistence are significant. |
| HONOR | Yes |  |
| KDDI | Yes | mTRP contributes to improved coverage and reliability, enhancing overall system performance, therefore it is important to operators. Coexistence with event-triggered L1 measurement reporting is not technically complex and can be achieved within the scope of Release 19 specifications. |
| NTT DOCOMO | Yes |  |

**Summary for Q3:**

* Nearly all companies are fine to support the coexistence between mTRP and event-triggered MR for LTM in Rel-19.
* Some companies indicate they will be ready to support once the common approach is derived, based on Questions 1 and 2.

**Proposal 3: The coexistence between event-triggered L1 measurement reporting and mTRP for the source cell is supported in Release 19 LTM.**

# 3 Conclusion

In this document the following proposals have been made:

**Proposal 1: When mTRP is configured in the serving cell the UE uses the best beam (in terms of RSRP) of the two “current beams” for LTM event evaluation.**

**Proposal 2: RAN2 to discuss if the NW needs to know the exact TRP and thus MR MAC CE shall indicate the TCI state associated with the reported RSRP value for the serving/current beam.**

**Proposal 3: The coexistence between event-triggered L1 measurement reporting and mTRP for the source cell is supported in Release 19 LTM.**

# References

1. R2-2502981 *Report from session on R18 SL, R18/19 MOB and R19 NES* 3GPP TSG-RAN WG2 Meeting #129bis Wuhan, China, April 7th – 11th, 2025
2. R2-2504120 *Discussion on the support of mTRP in event-triggered LTM* Huawei, HiSilicon, Nokia, NTT Docomo, OPPO, ZTE, 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025
3. R2-2504331 *Remaining issues of L1 event triggered measurement reporting* Rakuten Mobile 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025
4. R2-2504408 *Remaining issues of event-triggered L1 measurement reporting for LTM* Kyocera 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025
5. R2-2504422 *Discussion on L1 event triggered measurement reporting for LTM* KDDI Corporation 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025
6. R2-2504472 *Discussion on measurement event evaluation and report* HONOR 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025
7. R2-2504135 *Final Details on L1 Measurement Reporting Enhancements for Rel-19 LTM* Nokia 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025
8. R2-2503616 *Running MAC CR for enhanced mobility Ph4* 3GPP TSG-RAN WG2 Meeting #130 St. Julians, Malta, May 19th – 23rd, 2025