**3GPP TSG-RAN2 Meeting #125bis** **R2-240xx**

**Changsha, China, April 15-19, 2024**

**Agenda Item:** 7.8.1

**Release:** Rel-18

**Work Item:** NR\_UAV-Core

**Source:** Qualcomm Incorporated

**Title:**  Report of [POST125][008][UAV] Draft TP for simulMultiTriggerSingleMeasReport (Qualcomm)

**Document for:**Discussion/Decision

# Introduction

RAN2#125 discussed ASN.1 review issues for Rel-18 UAV WI. Most of the RILs were concluded, however following are still open (see details in R2-2401607).

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| **ID** | **Delegate** | **Work Item** | **Class** | **TDoc** | **Status** | **Processed** | **Proposed Conclusion** | **Description** | **Proposed Change** | **Comments** | **Section** |
| V823 | vivo(Yuan LI) | UAV | 1 | None | ToDo |  | v210 | simulMultiTriggerSingleMeasReport is included per measId, while the UE should only compare the value between the altitude of the UE and the corresponding threshold in each event after checking all the measIds configured with such event, whose entry condition is satisfied as well. This can be misleading in the order of UE behaviour. | Remove the paragraphs related to select appliacable event in Clause 5.5.4.1; add a note in 5.5.5.1 as RIL V824. | QC as rapp: this would need further discussion if we want to remove/move the whole statements. I will only apply the other smaller changes in the CR and leave this for further discussion. | 5.5.4.1 General |
| Z077 | <ZTE (ZhangMengjie)> | UAV | 1 | None | ToDo |  | v210 | According to RAN2 agreement, simulMultiTriggerSingleMeasReport is applied to events that are triggered to send measurement reports. In current text procedure and field description, it is applied to events that satisfy entering conditions. However, event satisfying entering condition may not be triggered. The entering condition may not be satisfied during TimerToTrigger, or numberOfTriggeringCells may not be satisfied if it is configured. So we prefer to revise the text procedure and field description of simulMultiTriggerSingleMeasReport to align with following RAN2 agreement: When multiple events are configured simultaneously, network explicitly configures whether the UAV reports all triggered measurement reports or chooses the MR configuration corresponding to the triggered event with the smallest value between the altitude of the UAV and the altitude threshold. This flag applies for all events of the same type (Hx and AxHy) and MO (AxHy). This will be a separate capability. | we proposed two options: Option 1: to revise the text procedure and field description as following: 4> if the eventH1 or eventH2 is configured in the corresponding reportConfig: 5> for all the events of the same type for which simulMultiTriggerSingleMeasReport is set to true and the event is triggered the entry condition applicable for the event has been satisfied: 6> consider only the event with the smallest value between the altitude of the UE and the corresponding altitude threshold to be applicable; 4> else if the eventA3H1 or eventA3H2 or eventA4H1 or eventA4H2 or eventA5H1 or eventA5H2 is configured in the corresponding reportConfig: 5> for all the events of the same type associated with the same measObjectNR for which simulMultiTriggerSingleMeasReport is set to true and the event is triggered the entry condition applicable for the event has been satisfied: 6> consider only the event with the smallest value between the altitude of the UE and the corresponding altitude threshold to be applicable; simulMultiTriggerSingleMeasReport Indicates when multiple events of the same type for event H1, H2, A3H1, A3H2, A4H1, A4H2, A5H1 and A5H2, and same MO for event A3H1, A3H2, A4H1, A4H2, A5H1 and A5H2, trigger measurement reports satisfy the entering condition(s), whether to consider only the event with the smallest value between the altitude of the UE and the configured altitude threshold Option 2: if companies think option 1 is not the right place to capture the agreement, we think the alternative is to capture the agreement only in field description of simulMultiTriggerSingleMeasReport. The text procedure can be removed. | QC as rapp: Agree with the comment that the agreeemnt was for MR, not for entry condition. The text could be simply updated to change 'entry condition' to 'measurement report triggering condition' (The reason is 'the event is triggered' has not been used extensively for the events in the spec, but I find several instances of 'measurement report triggering condition'), however the issue is the triggering conditions are evaluated only later. So refering to the triggering conditions being satisfied would be premature at this point in the procedure. This can be discussed together with V823, V824, W015. | 5.5.4.1 General |
| W015 | NEC (Zonghui XIE) | UAV | 1 | None | ToDo |  | v210 | Describe the procedure from “each measId” aspect. | So far, the event triggering procedures are all described from “each measId” aspect. Considering other events when evaluate current measId seems not a common way. It would be better to say whether current event (for the measID) is applicable or not. Propose to change as follows: 4> else if the eventA3H1 or eventA3H2 or eventA4H1 or eventA4H2 or eventA5H1 or eventA5H2 is configured in the corresponding reportConfig: 5> if the entry condition applicable for the event has been satisfied: 6> if this is the only event for this event type associated with the same measObjectNR, or 6> if simulMultiTriggerSingleMeasReport for this event is not set to true, or 6> if this is the event with the smallest value between the altitude of the UE and the corresponding altitude threshold among all the events of the same type associated with the same measObjectNR for which simulMultiTriggerSingleMeasReport is set to true: 7> consider the event to be applicable; | QC as rapp: see comment in Z077 | 5.5.4.1 General |
| V824 | vivo (Yuan LI) | UAV | 1 | None | ToDo |  | v210 | Stated in V823. For the events of the same type supporting to trigger a single measurement report, it should be up to UE implementation to ensure that the measurement report contains the applicable mesID with the smallest value between the altitude of the UE and the corresponding altitude threshold, after all the events are entered and triggered measurement reporting. | Note: For the measurement reporting triggered by multiple events of the same type for which simulMultiTriggerSingleMeasReport is set to true, the UE ensures that only the measurement reporting triggered by the event with the smallest value between the altitude of the UE and the corresponding altitude threshold to be reported. | [Nokia – Jerediah] It should be clarified that the hysteresis should be considered as part of the threshold. More comments over email as this could be a longer discussion. QC as rapp: this would need further discussion if we want to remove/move the whole statements. I will only apply the other smaller changes in the CR and leave this for further discussion. | 5.5.5.1 General |

Following email discussion was setup to discuss further on the remaining RRC RILs:

* [POST125][008][UAV] Draft TP for simulMultiTriggerSingleMeasReport (Qualcomm)

Intended outcome: Review and agree to a resolution for [Z077][V823][V824][W015]

Deadline: March 28, 2024

This document is the report of the email discussion on the above open RILs.

# Contact information

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# Discussion

## Relevant RAN2 agreements

In this section, relevant prior agreements are listed for quick reference:

RAN2#124 agreement:

1 When multiple events are configured simultaneously, network explicitly configures whether the UAV reports all triggered measurement reports or chooses the MR configuration corresponding to the triggered event with the smallest value between the altitude of the UAV and the altitude threshold. This flag applies for all events of the same type (Hx and AxHy) and MO (AxHy). This will be a separate capability

RAN2#125 agreement:

=> The intent: if there has been multiple event of the same type/name for same MO, if there is a new event that was just triggered the UE should look at all previously triggered, but not yet reported, and discard those that are not the nearest one. The rapporteur will refine the intent and propose a text update over email discussion.

## Latest spec text

After the NR UAV CR agreed by RAN2#125 (in R2-2401605), the latest relevant spec text would be as follows:

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| 5.5.4 Measurement report triggering5.5.4.1 General If AS security has been activated successfully, the UE shall:  1> for each *measId* included in the *measIdList* within *VarMeasConfig*:  2> if the corresponding *reportConfig* includes a *reportType* set to *eventTriggered* or *periodical*:  3> if the corresponding *measObject* concerns NR:  <<skip>>  4> if the *eventA3* or *eventA5* or *eventA3H1* or *eventA3H2* or *eventA5H1* or *eventA5H2* is configured in the corresponding *reportConfig*:  5> if a serving cell is associated with a *measObjectNR* and neighbours are associated with another *measObjectNR*, consider any serving cell associated with the other *measObjectNR* to be a neighbouring cell as well;  <<skip>>  4> if the *eventH1* or *eventH2* is configured in the corresponding *reportConfig*:  5> for all the events with the same *eventID* for which *simulMultiTriggerSingleMeasReport* is set to *true* and the entry condition applicable for the event has been satisfied:  6> consider only the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest to be applicable;  4> else if the *eventA3H1* or *eventA3H2* or *eventA4H1* or *eventA4H2* or *eventA5H1* or *eventA5H2* is configured in the corresponding *reportConfig*:  5> for all the events with the same *eventID* associated with the same *measObjectNR* for which *simulMultiTriggerSingleMeasReport* is set to *true* and the entry conditions applicable for the event has been satisfied:  6> consider only the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest to be applicable;  3> else if the corresponding *measObject* concerns E-UTRA:  <<skip>> |

## Potential issues with the current spec text

From the discussion so far, rapporteur understands there are following possible issues with the current text:

1. The text refers to ‘*entry condition* applicable for the event’, whereas the intent/agreement was to address the *measurement report triggering condition*.
2. Due to different values of TTT and/or slightly different timing of fulfillment of the entry condition, it is unlikely that multiple *measurement report triggering condition* satisfy exactly at the same instant.
3. Nokia raised by email that there may be issue with “the case of having configured events to handle upward and downward movement of the aerial UE. For instance, there may be two events configured, say an *eventA4H1* and an *eventA4H2*. The *eventA4H1* is configured to handle the UE on its way up, and the *eventA4H2* is configured to handle the UE on its way down. In this configuration, when the Aerial UE is sufficiently between the two events such that the hysteresis for both is satisfied, the aerial UE will trigger reports for the *A4H2* and *A4H1* simultaneously because they have different *eventIds*.” However, rapporteur understanding is that the intent is NOT to mix/optimize different types of events. And once the text is updated to handle measurement report triggering conditions, the *hysteresis* will already be taken into account while evaluating the conditions. So, no further optimization is needed for this case.

**Q1: Please comment whether there are other issues not captured above or whether you have any views on the above understanding.**

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| **Company** | **Comment** |
| Sharp | For Issue 1, after further check, I have a question. Based on subsection 5.5.4, in measurement report triggering procedure, UE evaluates all the measIds in order. For each measId, when the event fulfills measurement report triggering condition, measurement report is submitted to lower layer immediately. And based on subsection 5.5.5, measurement reporting procedure is for only one measId. It means even there are multiple measIds fulfilling measurement report triggering condition simultaneously, they are handled one by one, and measurement reporting is sent one by one. Then is it possible that there are more than one measId previously triggered but not yet submitted to lower layer, when UE performs measurement reporting procedure in subsection 5.5.5?  [Rapporteur] Thanks for raising this. Indeed, I had thought about this and assume it depends on the implementation. Some implementations may send the meas report to lower layers *instantly* as soon as it is triggered (thereby creating one report for each triggered event in the lower layers tx queue), while others may process in batches, especially after the new UAV-specific text is there in the specification which gives guidance to process the H1/H2-based events of same name/*eventID* triggered fairly *simultaneously* (i.e. within a small duration of time, say in terms of several milliseconds, which is again up to implementation). If the events are triggered somewhat at different times, then multiple reports may be sent, which seems unavoidable. In fact, if the network configured different TTT for those events of same type, perhaps that was intention of the NW to have multiple reports triggered and sent. In any case each report can include the actual *altitude* of the UE, so there would be no ambiguity. |
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**Summary:** TBD

# Rapporteur Text Proposals

Based on the above discussion and understanding, rapporteur suggests moving the text from 5.5.4 Measurement report triggering to 5.5.5 Measurement reporting.

In the following, two options are shown. TP1 treats each event type (H1, H2, AxHy) separately to make it clearer. However, there is some repetition of text. TP2 shows more condensed TP but that may not be as clear. For both options, there are some common changes, shown in section 4.3 below.

## Text Proposal Option 1

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| 5.5.5 Measurement reporting5.5.5.1 General   Figure 5.5.5.1-1: Measurement reporting  The purpose of this procedure is to transfer measurement results from the UE to the network. The UE shall initiate this procedure only after successful AS security activation.  The UE shall:  1> for all the entries in the *VarMeasReportList* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventH1* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventH2* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventA3H1* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventA3H2* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventA4H1* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventA4H2* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventA5H1* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting is configured with *eventID* set to *eventA5H2* and *simulMultiTriggerSingleMeasReport* set to *true*:  2> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  For the *measId* for which the measurement reporting procedure was triggered, the UE shall set the *measResults* within the *MeasurementReport* message as follows:  1> set the *measId* to the measurement identity that triggered the measurement reporting;  1> for each serving cell configured with *servingCellMO*:  2> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *rsType*:  3> if the serving cell measurements based on the *rsType* included in the *reportConfig* that triggered the measurement report are available:  <<skip>> |

## Text Proposal Option 2

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| 5.5.5 Measurement reporting5.5.5.1 General   Figure 5.5.5.1-1: Measurement reporting  The purpose of this procedure is to transfer measurement results from the UE to the network. The UE shall initiate this procedure only after successful AS security activation.  The UE shall, for each entry in the *VarMeasReportList*:  1> if the *eventH1* or *eventH2* is configured in the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting:  2> among all the events that triggered the measurement reporting with the same *eventID* for which *simulMultiTriggerSingleMeasReport* is set to *true*:  3> except for the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest, remove all the other measurement reporting entries from the *VarMeasReportList*, if any;  1> else if the *eventA3H1* or *eventA3H2* or *eventA4H1* or *eventA4H2* or *eventA5H1* or *eventA5H2* is configured in the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting:  2> among all the events that triggered the measurement reporting with the same *eventID* associated with the same *measObjectNR* for which *simulMultiTriggerSingleMeasReport* is set to *true*:  3> except for the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest, remove all the other measurement reporting entries from the *VarMeasReportList*, if any;  For the *measId* for which the measurement reporting procedure was triggered, the UE shall set the *measResults* within the *MeasurementReport* message as follows:  1> set the *measId* to the measurement identity that triggered the measurement reporting;  1> for each serving cell configured with *servingCellMO*:  2> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *rsType*:  3> if the serving cell measurements based on the *rsType* included in the *reportConfig* that triggered the measurement report are available:  <<skip>> |

## Common for both TP options

For both TPs shown above, the related existing text from 5.5.4.1 would need to be removed and *simulMultiTriggerSingleMeasReport* field description should be corrected.

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| 5.5.4 Measurement report triggering5.5.4.1 General If AS security has been activated successfully, the UE shall:  1> for each *measId* included in the *measIdList* within *VarMeasConfig*:  2> if the corresponding *reportConfig* includes a *reportType* set to *eventTriggered* or *periodical*:  3> if the corresponding *measObject* concerns NR:  <<skip>>  4> if the *eventA3* or *eventA5* or *eventA3H1* or *eventA3H2* or *eventA5H1* or *eventA5H2* is configured in the corresponding *reportConfig*:  5> if a serving cell is associated with a *measObjectNR* and neighbours are associated with another *measObjectNR*, consider any serving cell associated with the other *measObjectNR* to be a neighbouring cell as well;  <<skip>>  ~~4> if the~~ *~~eventH1~~* ~~or~~ *~~eventH2~~* ~~is configured in the corresponding~~ *~~reportConfig~~*~~:~~  ~~5> for all the events with the same~~ *~~eventID~~* ~~for which~~ *~~simulMultiTriggerSingleMeasReport~~* ~~is set to~~ *~~true~~* ~~and the entry condition applicable for the event has been satisfied:~~  ~~6> consider only the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest to be applicable;~~  ~~4> else if the~~ *~~eventA3H1~~* ~~or~~ *~~eventA3H2~~* ~~or~~ *~~eventA4H1~~* ~~or~~ *~~eventA4H2~~* ~~or~~ *~~eventA5H1~~* ~~or~~ *~~eventA5H2~~* ~~is configured in the corresponding~~ *~~reportConfig~~*~~:~~  ~~5> for all the events with the same~~ *~~eventID~~* ~~associated with the same~~ *~~measObjectNR~~* ~~for which~~ *~~simulMultiTriggerSingleMeasReport~~* ~~is set to~~ *~~true~~* ~~and the entry conditions applicable for the event has been satisfied:~~  ~~6> consider only the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest to be applicable;~~  3> else if the corresponding *measObject* concerns E-UTRA:  <<skip>> |

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| *EventTriggerConfig* field descriptions |
| ***simulMultiTriggerSingleMeasReport***  Indicates when multiple events with the same *eventID* satisfy the ~~entering~~ measurement report triggering condition~~(~~s~~)~~, whether to consider only the event with the smallest value between the altitude of the UE and the configured altitude threshold. |

**In rapporteur’s view, TP1 is preferable. Even though TP1 looks verbose, it is clearer.**

**Q2: Please indicate which text proposal is preferred as baseline, and any additional comments/suggestions. The baseline TP will be updated based on comments.**

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| **Company** | **Preference for TP baseline (TP1/TP2/Other)** | **Comment** |
| LGE | text in TP1 with TP2’s structure | To avoid redundancy, we prefer the structure of TP2. However, to ensure clarity, it seems more appropriate to use TP1 text, i.e., comparative sentences about entries rather than events.  For example:  1> if the *eventH1* or *eventH2* is configured in the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting:  2> for all the entries in the *VarMeasReportList* for which the corresponding *reportConfig* is configured with the same *eventID* and *simulMultiTriggerSingleMeasReport* set to *true*:  3> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the *VarMeasReportList*, if any;  1> else if the *eventA3H1* or *eventA3H2* or *eventA4H1* or *eventA4H2* or *eventA5H1* or *eventA5H2* is configured in the corresponding *reportConfig* associated with the *measId* that triggered the measurement reporting:  2> for all the entries in the *VarMeasReportList* associated with the same *measObjectNR* for which the corresponding *reportConfig* is configured with the same *eventID* and *simulMultiTriggerSingleMeasReport* set to *true*:  3> except for the entry corresponding to the event for which the difference between the configured altitude threshold and the altitude of the UE is the smallest, remove all other measurement reporting entries from the VarMeasReportList, if any; |
| Sharp | Comments | If it is possible to compare multiple measIds in subsection 5.5.5, then TP2 or something like this is preferred.  Else, the nearest event may be applied in subsection 5.5.4 as in latest spec text, but without checking the fulfilling condition. Since the gNB configures height-dependent events, the easiest way is to evaluate the nearest event only.  [Rapporteur]: please see comments in Q1.  Regarding *evaluating* the nearest event only, going back to that seems less likely for the following reasons although personally I would be fine with that:  - there are arguments that the RAN2 formal agreement was for pruning based on ‘triggered’ measurement reports, not on pruning the conditions to be evaluated (including entry conditions).  - there is no guarantee that the nearest event will eventually trigger a meas report. Therefore, disregarding other events may result in a situation where an event that would’ve triggered is already ignored but the event that caused such pruning never triggered, resulting in no reporting at all. E.g., suppose H1-based events are configured for 100m and 150m and UE is at 160m. At the time of evaluation 100m event is disregarded since the 150m event is the closest. But the 150m event didn’t trigger the report (e.g. the UE moved back to below (150-hyst)m before TTT for 150m event expired). Eventually no report would be sent due to the H1-based events in this case, which is not the intent. |
| Qualcomm | LGE’s proposed refinement to TP2 | Thanks to LGE for refining the TP. This looks better than both TP1 and TP2. |
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**Summary:** TBD

# Misc/Other

**Q3: Please list below if there are other open issues which should be addressed in this email discussion.**

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| **Company** | **Issue/Question** | **Comment/Details** |
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**Summary:** TBD

# Summary

TBD