**3GPP TSG RAN WG2 Meeting #116bis-e**   **R2-220xxxx**

**E-Meeting, 17th – 25th January 2022**

**Agenda Item:** **8.24.3**

**Source:**  **Qualcomm Inc.**

**Title:** **Duplicate Measurement Reply LS**

**Document for:** **Make a reply to LS**

# Introduction

Email discussion is to discuss the following offline topic:

* [AT116bis-e][045][NR17] Duplicate Measurement Reply LS (Qualcomm)

      Scope: Treat R2-2200135, R2-2201083, R2-2201084. Make a reply LS

      Intended outcome: Approved reply LS

      Deadline: Friday W1

This document aims to discuss proposals submitted in section 8.24.3 of RAN2#116bis, related to measurement result duplication, and reach an agreeable response to RAN5 LS [1].

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# Duplicate Measurement Result

RAN5 query is about duplicating the measurement result of the SCell in *measResultServingCellMOList* and in *measResultNeighCells* when SCell is considered as a neighbour in event A3/A5 evaluation and the servingCellMO flag is set for this SCell. RAN5 wants to know if duplication is mandatory, or if it’s sufficient to include results in the *measResultNeighCells* which is primarily used for handover evaluation

Quote from the RAN5 LS [1]:

***ACTION: RAN5 respectfully asks RAN2 to reconfirm core spec intention is to mandate SCell measurements to be duplicated in both measResultServingCellMOList and measResultNeighCells.***

The draft LS [2] that was shared by Nokia, have the following suggested responses:

**Question 1:** **In the RAN5 test case [2] event A3/A5 is used for Handover evaluation where Scell measurements if included in the measResultNeighCells are checked, is there a need to mandate the duplication of the measurements by including it in the measResultServingCellMOList as well?**

Answer 1: In RAN2 understanding the network may not need such duplicated results, but it is not an issue if duplicated measurement results are reported. The latter is considered to be easier from the UE’s perspective.

**Question 2: If the answer to Question 1 it is “not mandatory”, can it be assumed that UE can either include it in both lists or at least in measResultNeighCells list?**

Answer 2: In RAN2 understanding the UE shall include the results in both IEs (i.e. measResultServingCellMOList and measResultNeighCells) if the UE was configured to do so, even if this leads to duplicated reporting.

## Discussing response to Question-1

**Q1-** the answer provided has 2 parts, please provide your feedback for each part:

* Part-A: whether duplication is provided by the UE or not, the network is capable of handling both cases (duplication or single measurement results) with no issue.
* Part-B: it’s easier for the UE to provide duplicate the measurement result, i.e. measurement is included in both lists

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| **Companies** | **Agree with Part-A?** | **Agree with Part-B?** | **Comments** |
| Qualcomm | Yes | No | Part-A:   * As a UE vendor, we can’t provide a valuable response, as we don’t have insight about the network implementation, however having duplicate measurement result in the same report, seems to be a benign duplication with no implication to network.   Part-B:   * First, we need to make it clear, that it’s an inefficient approach for transmitting duplicate measurement result in the same report, given UE is at the edge of the cell (power limited). * Second, duplicate measurement result is a **spec flaw**, caused by a change made to the spec in the previous meeting, where network was mandated to configure the SCell MO with the servingCellMO flag, so “**some”** UE would consider performing measurement on the SCell as a “**neighbour**” cell. * Third, as a UE vendor, the level of difficulties/easiness depends on the UE implementation, so it should not be assumed it’s easier to duplicate the measurement result as it differs from one UE to another. |
| Ericsson | - | - | The questions talk about what UEs/NWs are capable of and what is easier to do. Nothing of this is complicated, and it would not be difficult to build a UE/NW capable of either direction.  The more interesting question would be what has actually been implemented.  **[Moderator]: agree, the question is about the UE is currently in the field, as some don’t report the measurement twice. How do you suggest moving forward?**  **To be clear, originally there was 3 cases of configuration supported by the spec:**  **1-SCell MO is tagged with servingCellMO only 🡪 no issue**  **2-SCell MO is configured as neighbour cell (A3/A5)**   * **For this case Some UE’s implementation in the field are having issue, hence this case has been deprecated from the spec in the last meeting (per P2 in R2-2111182).**   **3- SCell MO is configured as neighbour cell (A3/A5) and tagged with servingCellMO**   * **Another set of UEs are having issue with this case, i.e. can’t report duplicate measurement** * **The way out, is to leave it to UE implementation to either report duplicate measurement, or at least provided the measurement in the measResultNeighCells** |
| MediaTek | Yes | See comment | Part B is aligned with current SPEC. Not sure whether we should just say it easy or not. |
| Huawei, HiSilicon | See comment | See comment | First we think this is a Rel-15 issue, the original LS from RAN2 in R2-2111473 has already indicated it is Rel-15. We are a bit puzzled why this now becomes a Rel-17 discussion. We’d like to postpone it to Feb meeting.  Then we tend to agree with Ericsson, this is rather to understand how the situation is for existing implementation. Our immediate response is that part B is consistent with the current specification and we need more time to check whether other implementations can be acceptable. |
| Nokia | Yes | **-** | Part-A: The network can extract relevant measurement results from the report provided by the UE. As per legacy specification, the network expects them to be provided in both IEs.  Part-B: Up to UE vendors to comment what is indeed easier, but in our understanding it is straightforward to leave the current specification intact (assuming such behavior is implemented by UE vendors – the point also raised by Ericsson and Huawei), so from this point of view it is easier for the UE. Also, UE does not have to filter out some results, but reports as per configuration.  We also agree this is perhaps not a Rel-17 topic, but actually related to the first release of NR. However, if already discussed, let’s try to conclude something meaningful instead of attempting to discuss it again from scratch in February. |
| vivo | See comments | See comments | Part-A relies on the interpretation of NW vendors.  For Part-B, agree with the above, it’s not about the difficulty but about how to deal with the existing UE with another implementation, i.e., measurement is only included in *measResultNeighCells*.  Our suggestion is to leave it to UE implementation if no concerns from NW vendors. |
| ZTE | Yes | **-** | Agree with Nokia. |
| CATT | - | - | Share the same view with Huawei. |
| LGE | Yes | See comments | Part-A: Because the network configures measurement configuration, it expects duplicate measurement reports in both IEs. Therefore, we think that the network can deal with the duplicate results without problems.  Part B: It's hard to decide which is easier, but we prefer that the UE sends measurement report as the current specification, i.e., duplicate measurement results in both IEs. |
| Samsung | Yes | See comments | Agree with MediaTek. |
| Apple | Yes | See comment | We think Part B is what the current spec defines. |

## Discussing response to Question-2

**Q2-** the answer provided, suggests that it’s RAN2 understanding the measurement results to be included in both IEs (*measResultServingCellMOList* and *measResultNeighCells*) … **do you agree**?

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| **Companies** | **Yes or No** | **Comments** |
| Qualcomm | No | We **do not** carry the same understanding. As mentioned earlier, duplicating the measurement result is a spec flaw, which we are fine to live with it as long as it’s not mandated on the UE to do so. |
| Ericsson | Yes | We interpret the question as what the specified UE behaviour is. And in our view, the spec says that the UE duplicates.  Whether this is "a spec flaw" is another question. |
| MediaTek | Yes | Our understanding is that current SPEC does imply that UE include the duplicated results. |
| Huawei, HiSilicon | Yes | We also think the spec already indicates so. |
| Nokia | Yes | We think there is no need to change the specification (even if the current behavior is not fully optimal), as it may lead to two different UE behaviors (some UEs will report in both IEs, some in just a single, while the network will not know what to expect from each UE). Thus, we prefer to keep the principle the UE reports according to the configuration and does not perform any filtering/duplicated measurement results removal. |
| vivo | See comment | The current spec indicates to be included in both IEs. However, as a UE vendor, we cannot foresee any technical issue if it is only included in *measResultNeighCells.* |
| ZTE | Yes | We think it’s aligned with the current spec. |
| CATT | Yes | It’s the understanding with current spec. |
| LGE | Yes | According to the current specification, the UE is mandated to report duplicate results to the network. |
| Samsung | Yes | Whether there is a spec flaw seems different issue. |
| Apple | Yes | We also feel that whether there is a flaw is another issue. |

## Concluding the discussion

**Q3-** if it was agreed (based on previous questions), that network is capable of handling both UE implementations (duplicate/single measurement result), i.e. no need to mandate the inefficient of duplicating the measurement result, would **RAN2 agree that it’s left to the UE implementation on how it handles such case**?

* UE implementation could be either:
* Measurement result is included twice in the same report, in the “*measResultServingCellMOList*” and in “*measResultNeighCells*”.
* Measurement result is included once in the report, in the “*measResultNeighCells*”.

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| **Companies** | **Yes or No** | **Comments** |
| Qualcomm | Yes | If there is no network implication (which should be the case), there is absolutely no need to mandate such inefficient behaviour, **instead it should be left to UE implementation.** |
| Ericsson | No | It is important to have the uniform UE behaviour across chipset vendors so that the network can rely on reading only parts of the measurement report for a specific purpose.  We do not have a very strong view which behaviour is clarified, but it is important that we have **one** behaviour. |
| MediaTek | See comment | We also fine to leave this to UE implementation considering there is already different implementation in the field. It does NOT really cause any issue and we don’t think one ehaviour is critical in this particular case. |
| Huawei, HiSilicon | No | We understand duplicated measurements are consistent with the spec and we prefer to go for duplicated measurements from the UE side. Although the measurements are duplicated, the purpose is different, one is for PCell mobility and the other one is for SCell addition. Thus we think both have their own usages.  **[Moderator]: we carry the same understanding about this statement “*Although the measurements are duplicated, the purpose is different*” … if this is the case, why in the previous meeting (P2 in R2-2111182), it was mandated that network shall tag any SCell MO with servingCellMO in order for the UE to perform measurement, when the purpose of measurement is only for PCell mobility, i.e. SCell measurement as neighbor cell is only needed?**  **We’re fine reverting the previous agreement and no need for this change.**  [HW]: We understand the previously agreed P2 in R2-2111182 is not conflicting with the current discussion. The SCell MO tagged with servingCellMO for triggering A3/A5 event can be used for PCell mobility, but this is not the only usage. The SCell MO can also be used for SCell addition. |
| Nokia | No | As commented to Q2, in order not to introduce multiple UE behaviors for such reporting, we insist it shall not be left up to UE implementation. |
| vivo | See comment | Fine to leave this to UE implementation. But the final decision may rely on the interpretation of NW vendors as the measurement report is for the RAN node to make the related decision. |
| ZTE | No | Agree with Ericsson and Nokia. We also think it’s important to have a consistent UE behaviour cross different UE vendors. |
| CATT | No | We also think it’s important to have a unified UE behavior. |
| LGE | No | To prevent different behavior per UE, we need to determine the uniform behavior of the UE, i.e., duplicate results in both IEs or one result in measResultNeighCells, and we prefer that the UE sends measurement report as the current specification, i.e., duplicate measurement results in both IEs. |
| Samsung | See comments | We are also fine to leave this up to UE implementation as there seems no critial issue in the field. |
| Apple | See comments | We don't have strong view. Just wondering is this a little bit late for Rel-15 if no IoT issue is found? |

# Conclusion

To be included later.

# References

[1] R2-2200135 LS on Duplicate Measurements when SCell is a Neighbor Cell

[2] R2-2201083 [DRAFT] Response LS on duplicated measurements for SCell

[3] R2-2201084 On duplicated measurement results when SCell is a neighbour